

RAILROAD GAZETTE

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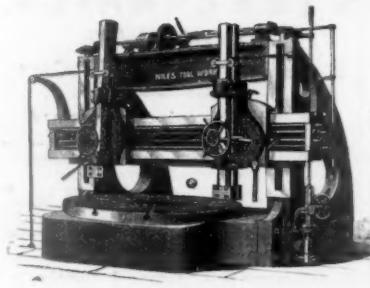
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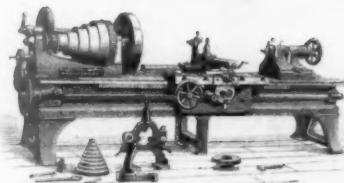


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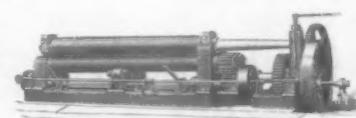
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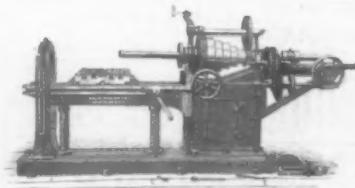
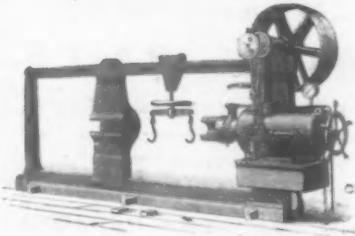
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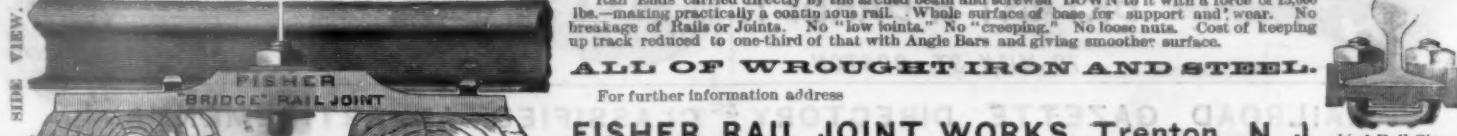
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Canning, R. & Co.	xi	Diamond Frog & Crossing Co.	xxv	Diamond Frog & Crossing Co.	xxvii	Diamond Frog & Crossing Co.	xxii	Zimmerman, C. E.	—	Zimmerman, C. E.	
Cayuta Wheel & Fdry Co.	xxxi	Diamond Frog & Crossing Co.	xxv	Diamond Frog & Crossing Co.	xxvii	Diamond Frog & Crossing Co.	xxii	Zimmerman, C. E.	—	Zimmerman, C. E.	
Central Iron & Steel Co.	xviii	Diamond Frog & Crossing Co.	xxv	Diamond Frog & Crossing Co.	xxvii	Diamond Frog & Crossing Co.	xxii	Zimmerman, C. E.	—	Zimmerman, C. E.	
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Ingersoll-Sergeant Rock Drill Co., 10 Park Row, N. Y.

Rand Drill Co., 29 Park Place, N. Y.

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Pittsburgh Reduction Co.

Architect

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Thomas Appleton, 305 Rialto Bldg., Chic.

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Wehn Pavement Co., 16 Essex Pl., N. Y.

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Acme Machinery Co., Cleveland, O.

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Fulton Mfg. Co., 129 Greenwich St., N. Y.

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Congdon Brake Shoe Co., Chicago, Ill.

Lappin Brake-Shoe Co., 45 Br'dway, N. Y.

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Detroit Bridge & Iron Co., Det., Mich.

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Elmira Bridge Co., Elmira, N. Y.

S. W. Frescoln, World Bldg., N. Y.

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Bethel Iron Bridge Co., E. Berlin, Conn.

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American Supply Co., Kansas City, Mo.

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J. G. Brill & Co., Philadelphia, Pa.

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Troyan Car Coup. Co., Troy, N. Y.

Trotman Car Coup. Co., Troy, N. Y.

Van Dorstton Car Co., Phila., Pa.

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Adams & Westlake Co., Chicago.

Dayton Co., Dayton, O.

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Baker Heater Co., 79 Greenwich St., N. Y.

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Dickson Mfg. Co., Scranton, Pa.
G. L. Fowler, 50 Broadway, N.Y.
Lima Machine Works, Lima, O.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N.Y.
Pittsburgh Loco. & Car Works, Pittsburgh,
H. K. Porter & Co., Pittsburgh, Pa.
Richmond (Va.) Loco. & Mach. Works,
Rogers Loco. & Mach. Works, Paterson, N.J.
Schenectady (N.Y.) Loco. Works.
Tait & Carlton, London, Eng.
Wharton E. R. Ry. Co., Phila.

Locomotives, Headlights

Nat. Elec. Headlight Co., Indianapolis,
Locomotives, Second-Hand

Reginald Canning & Co., 115 B'way, N.Y.

A. S. Males & Co., Cincinnati, O.

N. Y. Equipment Co., 15 Wall St., N.Y.

Locomotive staybolt Iron

Falls Hollow Staybolt Co., Cuyahoga Falls, O.

Lubricators

American Supply Co., Kansas City, Mo.

Nathaniel Mfg. Co., 92 Liberty street, N.Y.

Machinists' Tools

Acme Mfg. Co., Cleveland, O.

Bennett, Mfg. Co., Philadelphia, Pa.

Billings & Spencer Co., Hartford, Conn.

E. W. Bliss Co., Brooklyn, N.Y.

Brown & Sharpe Mfg. Co., Providence,

Ferracuti Machine Co., Bridgeton, N.J.

Gould & Everhard, Newark, N.J.

Edw. Harrington, Boston, Mass., Phila.

Hayes Planer Co., Portland, Me.

Loos & Allstatter Co., Hamilton, O.

Manning, Max & Moore, 111 Liberty St.,

Morse Tw. Dr. & Mach. Co., N. Bed'd. Mass.

Newark Mach. Tool Works, Newark, N.J.

Niles Tool Works, Hamilton, O.

Petrie & A. P., Philadelphia, Pa.

Geo. Planer, 120 Broadway, N.Y.

D. Saunders' Sons, Yonkers, N.Y.

Wm. Sellers & Co., Philadelphia.

Stiles & Parker Press Co., Middletown, Conn.

Stow Flexible Shaft Co., Phila., Pa.

Stow Flexible Shaft Co., Binghamton, N.Y.

Universal Radial Drill Co., Cincinnati.

Watson & Stillman, 210 E. 43d St., N.Y.

Westinghouse Machine Co., Pittsburgh.

Wharton R. R. Switch Co., Phila.

Malleable Iron Castings.

National Malleable Castings Co., Cleve-

land.

Mandrel Rolled Staybolt Iron

Falls Hollow Staybolt Co., Cuyahoga Falls, O.

Mining Machinery

Lidgerwood Mfg. Co., 96 Liberty St., N.Y.

Union Iron Works, San Francisco.

Moist Wringer

Boston Wringer Co., Boston.

Not Locks

American Supply Co., Kansas City, Mo.

Amer. Washer & Mfr. Co., Newark, N.J.

Metcalf, Paul & Co., Pittsburgh, Pa.

National Lock Washer Co., Newark, N.J.

N. Y. Equipment Co., 2 Wall St., N.Y.

Ruffner & Dunn, Chicago, Pa.

Ruffner & Dunn, Philadelphia, Pa.

Oil Cans

Bryant & Barber, 79 Milk St., Boston.

H. A. Williams Mfg. Co., Boston.

Oil

Signal Oil Works, Ltd., Franklin, Pa.

Packing, Asbestos

W. H. Johns Mfg. Co., N.Y. City.

Packing-Rubber

N. Y. Belting & Pack. Co., N.Y. City.

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F. W. Devos & Co., Fulton St., N.Y.

Jos. Dixon Crucible Co., Jersey City, N.J.

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American Supply Co., Kansas City, Mo.

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Show Mfg. Co., Binghamton, N.Y.

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Johns & Co., Pittsburgh, Pa.

Pulleys

Boston & Lockport Block Co., Boston,

Pumps

Fairbanks, Morse & Co., Chicago.

Laddie & Dunn, Cincinnati, O.

Van Every, 119 So. 4th St., N.Y.

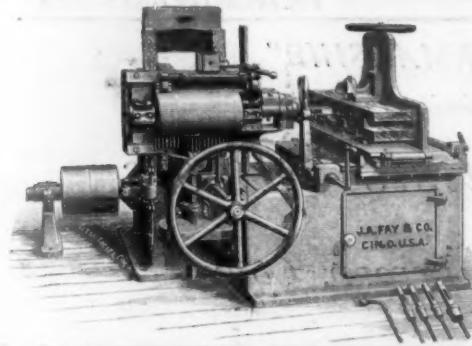
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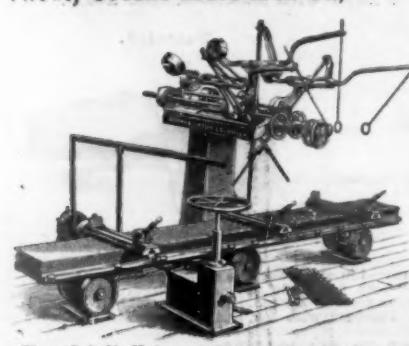
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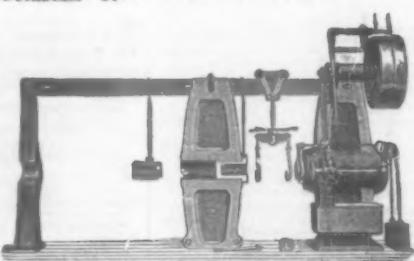
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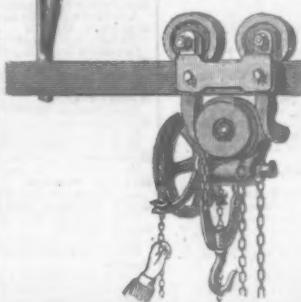
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Double, Single,
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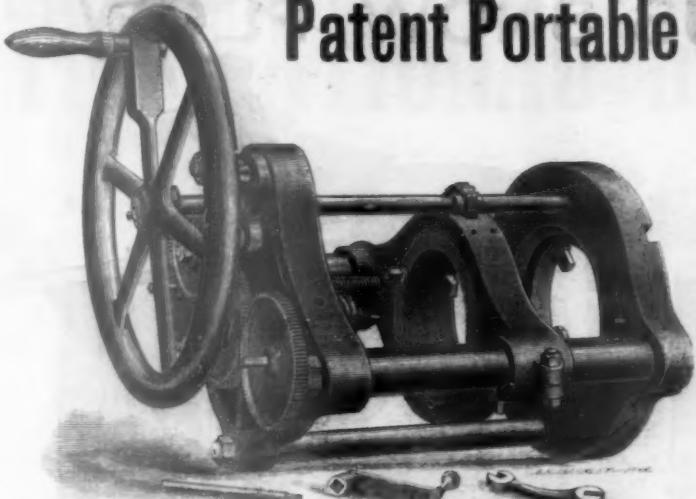
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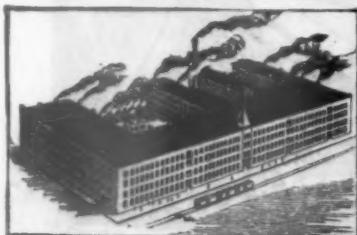
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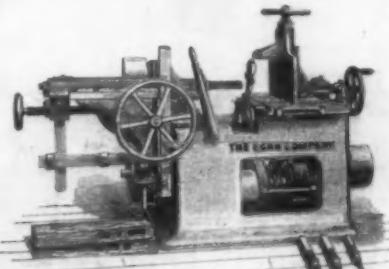
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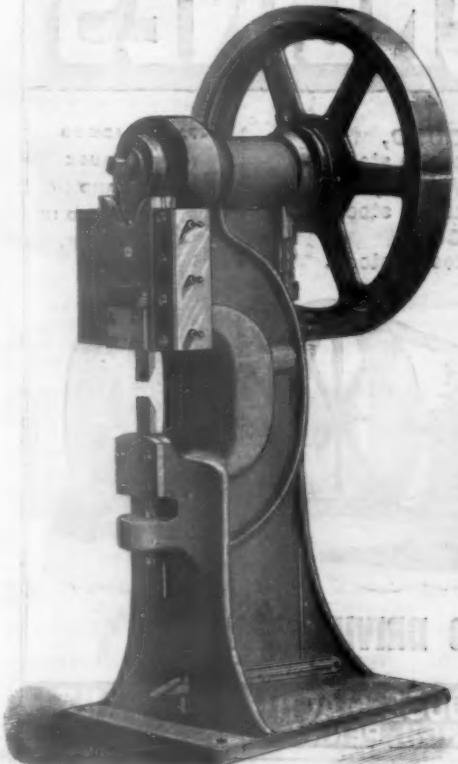
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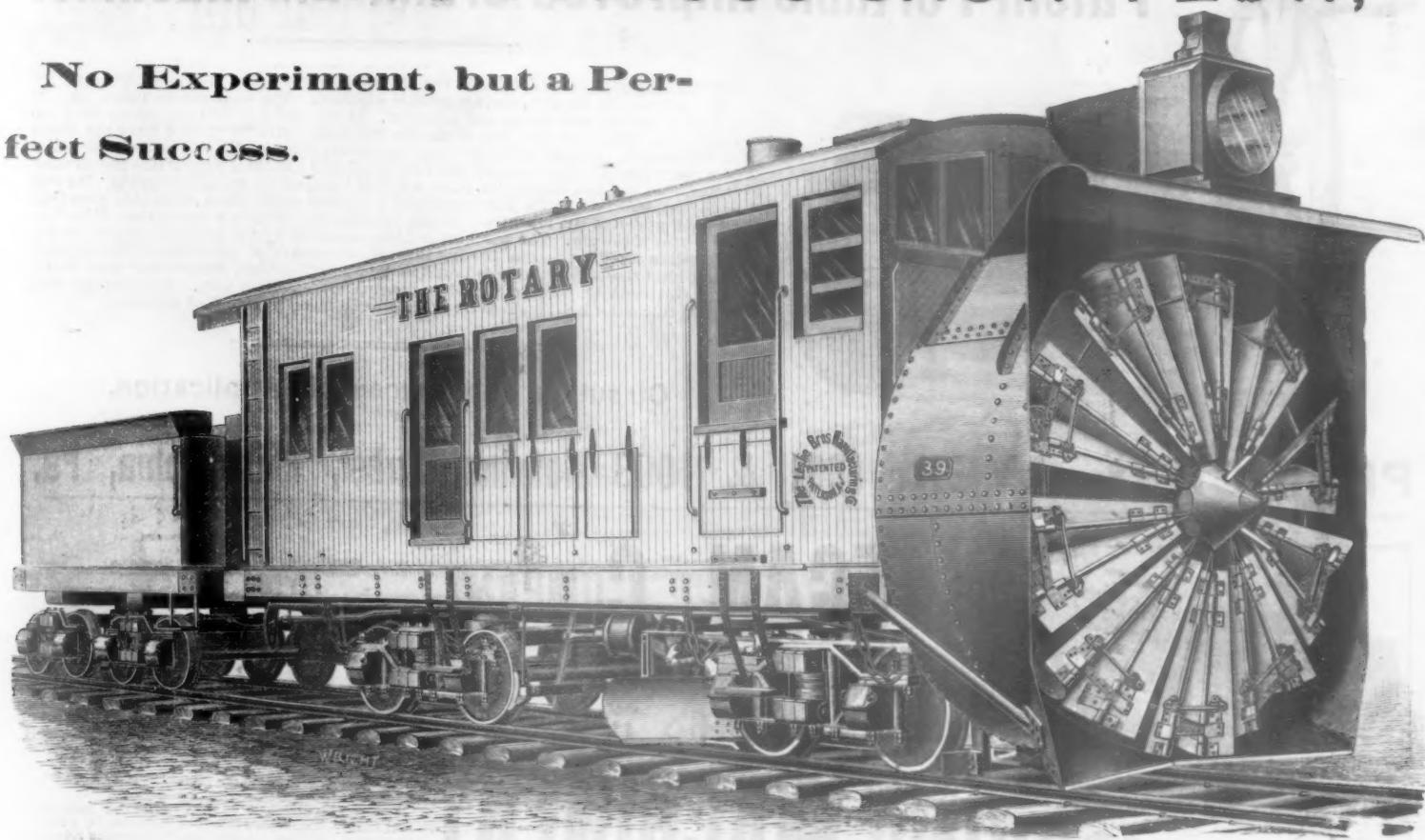
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 THE VERTICAL PLANE MUST GO.
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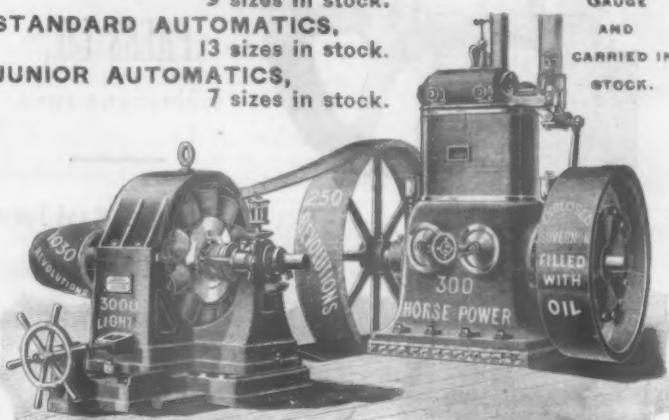
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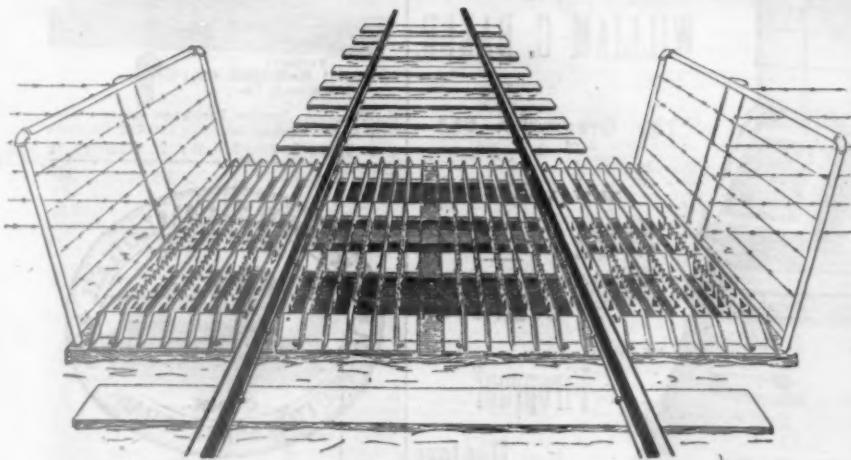


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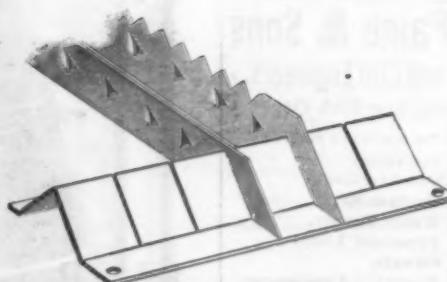
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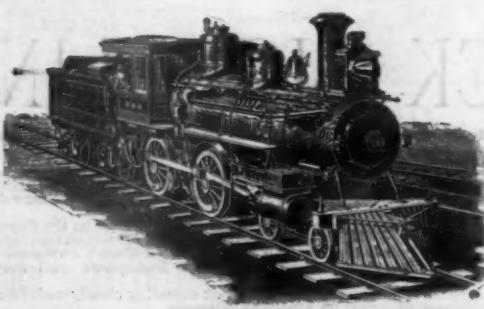
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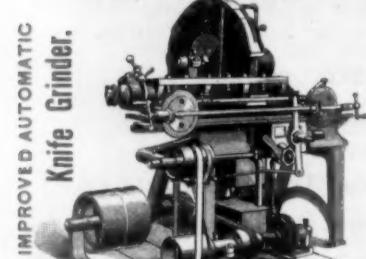
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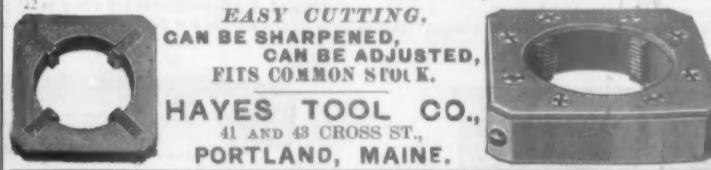
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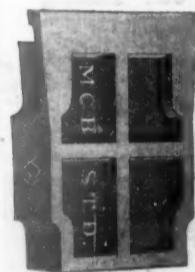
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Official Records, 10,676

Standard Couplers.

Date.	Drawheads.	Knuckles.
September, 1890,	- 5	49
October, "	- 8	81
November, "	- 48	147
December, "	- 80	131
January, 1891,	- 22	116
February, "	- 66	122
March,	- 68	172
April,	- 51	176
May,	- 18	100
June,	- 28	110
July,	- 18	72
August,	- 19	104
September,	- 21	78
October,	- 18	112
Total,	422	1,868

PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads,	- - - - -	3 ²⁹ ₁₃₃
Knuckles,	- - - - -	12 ⁵⁴ ₁₀₀

LIFE.

Drawheads,	- - - - -	30 years.
Knuckles,	- - - - -	8 "

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Compare the Following:

10,000 Couplers.

Date.	Drawheads.	Knuckles.
September, 1890	- - 174	188
October, "	- - 147	311
November, "	- - 274	492
December, "	- - 283	508
January, 1891	- - 252	382
February, "	- - 271	484
March,	- - 249	688
April,	- - 228	522
May,	- - 216	560
June,	- - 227	511
July,	- - 231	484
August,	- - 282	455
Total,	- - 2,781	5,455

PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads,	- - - - -	27 ⁸¹ ₁₀₀
Knuckles,	- - - - -	54 ⁵⁵ ₁₀₀

LIFE.

Drawheads,	- - - - -	3 yrs. 6 mos.
Knuckles,	- - - - -	1 " 9 "

Should seventy-five per cent. of above breakages be replaced without charge, and twenty-five per cent. at, say **\$9.20** each for drawheads, and **\$2.80** for knuckles, the cost of maintenance would be about **\$2.04** per car per annum, and would cost, exclusive of locks, etc.

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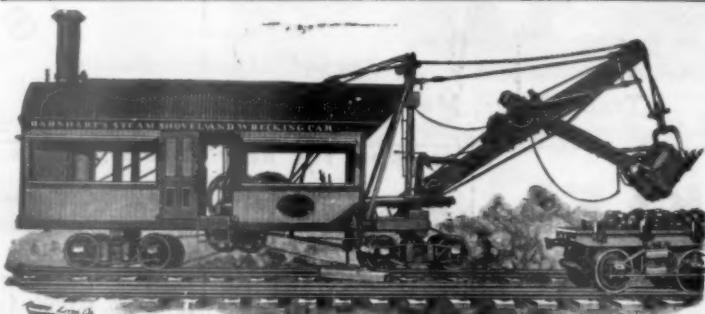
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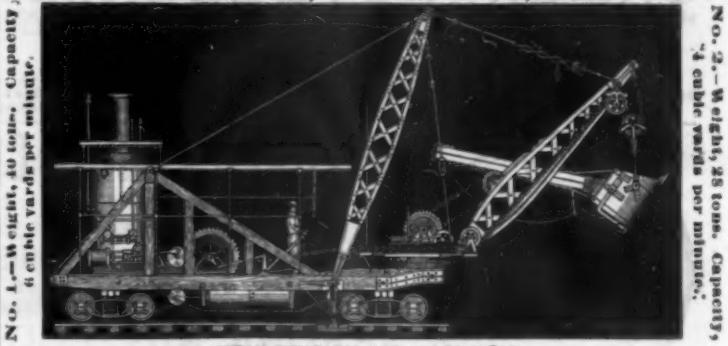
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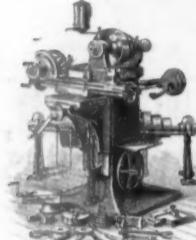
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RAILROAD GAZETTE

FRIDAY, JAN. 29.

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Contributions.

Track on Curved Bridges.

CHICAGO, Ill., Jan. 3, 1892.

TO THE EDITOR OF THE RAILROAD GAZETTE:

We are always boasting of our progress in bridge building, but there is not yet a rational method in obtaining the elevation for track on curved bridges. Let us examine the various plans:

Let, wedged shaped ties, thick at one end and thin at the other, necessitating a large quantity of material on a sharp curve; 2d, a block of wood under the high rail, securely fastened by means of bolts and spikes, and 3d, having the block on top, a very objectionable arrangement, especially in case of derailment. I think the proper method would be to raise and lower the track stringers, as shown by sketch. This method would allow the regular standard ties to be used. Don't you think some of our engineers ought to try it?

ELI MEWOL.

Argument of a West Shore Telegraph Operator.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A short time since it was my pleasure to read an article by our Division Superintendent in relation to the train service. [Railroad Gazette, Nov. 20, 1891.] Very naturally our thoughts return to our own department (the telegraph) for comparison, to see what one or more of the new ideas which he presents can be applied to us. To me it seems strange that considering the large number of successful railroad managers who have risen from operators to positions of rank and authority no effort has been made by them to place the telegraph on a more reliable and sound working basis.

When we consider the part which the telegraph has taken in the rapid extension and development of the railroad systems and try to imagine the telegraph left out of the development, we can understand how it is the life of the railroad. But what state of affairs do we find? That by reason of the very small and unreasonable salaries paid to operators (very often less than \$40, sometimes less than \$35 per month, and seldom over \$40), only a poor class, on the average, have entered the service and to-day the fact that you are an operator is sufficient cause for being looked down upon. Just think of it! Forty dollars a month for 12 to 16 hours work for seven days every week. For this salary the operator must be thoroughly competent to handle train orders, telegrams of the greatest importance in the handling of

life and property. Generally his duties are those of an agent, and as such he has to cover several departments intelligently. If he neglects to secure some large consignment of freight, or to catch a party for the "personally conducted," etc., vestibuled trains, there will be war from both sides of the traffic department. If in a hurry in performing the duties of baggage master, he should mismatch a check, he will have several opportunities for explanation. While doing these duties the dispatcher has been calling vigorously for the purpose of giving orders to help a train at another point. If, in the mean time, the operator has not watched the wire to see what orders are out, and consequently has failed to detect an error made by the overworked dispatcher, he is accused by the coroner's jury as an accessory to crime.

A track laborer makes \$1.40 for ten hours work. He has only to follow the directions of a foreman. If he works Sunday he gets paid for it, or if called out to clear wrecks, etc., he is paid proportionately: and his pay is equal to the operator's, while he did not have to spend months or years in acquiring his trade. The operator gets \$40, but he has averaged 14 hours per day with not a cent for overtime and nothing for Sundays. He does not get even thanks for remaining on duty with a wreck and a feeble remonstrance is met with a gruff reply that "if you don't like it, you know what you can do." This is the reward after serving the company for years with the knowledge, that "All employees shall be considered in line of promotion, advancement depending on length of service and capacity for increased responsibility."

The engineer (who carefully observes the operator's block and other signals and whose life wouldn't be worth an expired time order if a single character or letter were omitted from the order which he gets from the \$40 operator) will draw more money the second year by reason of a graded service, and if it is his "right" he gets the next passenger run. His conductor considers himself fortunate in being "grouped" with the fast freight crews, and he may possibly catch a few excursions in their season. By the use of a correct working basis for train crews the service is benefited more than can be calculated by dollars and each man knows what his standing is for promotion, depending on faithful service.

Yet neither position to which I have referred is more important or involves a particle more responsibility than the \$40 operator. Is it any wonder that operators lose interest in their work, and that the company eventually loses more money than the operator asks for as a reasonable compensation?

Would it not be well to consider the plan of our superintendent for classifying and grouping the trainmen, and apply it to the telegraphers? Why not something like this: Let those operators who are able to receive and transmit ordinary messages and work a block signal comprise one group at a uniform salary for the first year. At the end of one year, if no promotions are made and it is evident that there is an effort or desire for higher work shown by the men qualifying themselves for it, let there be an increase. Let there be another group who, having served in Group 1 and qualified for higher service, are capable of handling train orders and ordinary messages rapidly and safely, and who are posted on general station duties, yard-office work, work at relaying, terminal or junction points. There should be not less than ten dollars per month increase over the first group, and at the end of another year an increase to stimulate them to further and higher qualifications, as well as a recognition of faithful and continued service. The third group naturally follows by promotion from the second, and should include managers of relay offices, circuit managers, relief agents, tunnel block men, dispatchers, assistants, interlocking tower men, and those who are serving in the second group and are qualified to fill any of these positions when the opportunity presents itself. There should be an increase of at least \$10 over the second group rate. Operators in this class would, however, have considerable incentive to keep well up in their work by those crowding from below, so that an increase would hardly be necessary after a term. In addition to this there should be an allowance for overtime and extra for Sundays in all the classes.

Any one can readily see to what state of perfection the telegraph department could be brought by a course of discipline something after this plan. It is the best plan to overcome the striking propensities of some operators.

The question naturally arises as to what would be a reasonable salary for a starter in group 1. When we consider that it is from this class that future promotions to the second and third groups are made, it is seen that they should be at least of ordinary intelligence, or, in other words, possess the crude material of which our future officers are to be made, coming up through the various stages of development. It could hardly be expected to obtain such men for \$40 per month.

AJAX.

Electric Cranes with a Special Reference to one in use in the Baldwin Locomotive Works.

BY C. J. BATES.

[WITH AN INSET.]

The use of electricity, as a motive power for cranes, attracting much attention on account of its facility of application, range of power and speed, and delicacy of touch, if we may use the expression. The last is of great

importance where very gentle movement of heavy masses is necessary, as in the foundry, where heretofore only hand power cranes were considered practicable.

In the following the writer endeavors to convey a general description; but special reference is made, where particulars are necessary, to the 100-ton cranes built for the Baldwin Locomotive Works, by Messrs Wm. Sellers & Co. Such description is made as complete as possible without reference to detail drawings.

Generally speaking the crane consists of a bridge composed of two parallel girders supported at each end on tracks, on which it can be made to move from point to point as may be desired. The hoisting trolley, which are carriages containing the drums with necessary gearing, are supported on rails that rest on the lower flanges of the girders. As it is impossible to use lower lateral bracing, owing to the necessity for clear space, the tendency of the trolley to produce an outward thrust of the lower flanges of the girders, is met by braces that extend from these lower flanges to the top cross struts, which extend beyond the girders for that purpose, as shown in the cut. In addition to the above top lateral struts are angle iron lateral braces of the usual form. The only vertical stiffening is from the outside braces mentioned.

The girders are designed to support the greatest load that may come on them from any position of the trolley, with special reference to stiffness. The engraving shows the number of stiffeners used on the web. The ratio of depth to span of girder varies for different conditions of location. In the Baldwin shop the span of the bridge between centres of supporting rails is 74 ft. 8 in., and the girders are 7 ft. deep, out to out of flanges. From centre to centre of webs the girders are placed 9 ft. 3 in. apart. The bridge is carried by four 5-ft. wheels with double flanged steel tires, which run on the supporting rails mentioned, with a wheel base of about 14 ft. The rails were made especially for this case, and weigh 300 lbs. per yard, being 6 in. high, with 4-in. tread, 6-in. base and 1-in. web. Securely bolted to the rail and runway is a rack, 2½-in. pitch and 4-in. face, into which the driving gears are meshed.

Ordinarily, where the objects to be lifted are not too bulky to be supported at one point, one hoisting trolley may be used on the bridge. But in this case, where the lifting of such a mass as a locomotive requires it to be raised at both ends simultaneously, it is necessary to use two trolleys which run on the rails supported by the lower flanges of the girders. The hoisting trolleys are, each in itself, complete hoisting machines, to which power may be applied without reference to its source.

In the cases considered the immediate source of power is the dynamo. From the dynamo the electric current is conducted to two 7½-in. copper rods, supported by yellow pine strips, which are insulated by glass. On these rods run two four-wheeled trolleys of the "Wheeler type." It is thought by the makers that wire cables are better than the rods, as the latter are inclined to buckle under expansion, while the cable could sag between supports, to which there is no objection. It is also suggested that the current be supplied to the rod or cable at various points instead of being carried by it all from one end.

The "Wheeler" trolleys are each connected to a 40-H. P. U. S. Electric Light Co.'s motor, shunt wound, constant speed, for 230-volt current. These two motors, running at 500 revolutions per minute, stand on the top of the bridge over the operator's platform and are belted to the systems of gearing below, that operate the hoisting trolleys. The two systems, one for each trolley, are set one on each side of the bridge, and are connected by a belt across the bridge. The advantage of this connection is as yet an unsettled question, for in the event of one motor running at a higher speed than the other from any cause it might make the other motor act as a dynamo, throwing current back into the cable and probably result in burning the stronger motor. The cross belt is in use, however, in Baldwin's shop without deleterious effect.

The systems of gearing on each side, driven by the 40-H. P. motors, consist essentially of a combination of gears, with clutches for stopping and starting and reversing, and for two changes of speed. These systems are connected with the hoisting trolleys by three square shafts to each trolley, running in movable hangers which allow the trolleys to pass them. These shafts operate the gearing for hoisting and lowering, for traversing the trolley, and a clutch for giving two changes of speed on the trolley. This gives on each trolley four changes of speed for hoisting or lowering, as follows: 5, 10, 20 and 40 ft. per minute, and two changes of speed for traversing the trolley, of 50 and 100 ft. per minute.

The two hoisting trolleys are entirely independent of each other. The driving shaft, across the top of the trolley, which is operated by one of the square shafts mentioned, is connected with the drums, through an intermediate shaft, by gears of two sizes, to either of which it may be connected by a clutch, giving the two speeds before mentioned. On the intermediate shaft is a special clutch that by its action holds the weight at any point until released by the driving power, either in raising or lowering, so there is no possibility of the apparatus lowering with a "run," when either changing direction or from one speed to another.

The drum is composed of two parts, mounted on the same shaft, one part keyed and one loose. Both parts are geared to the driving shaft, and must run together.

The object in making one loose on the shaft is to allow for any slight play, and thus prevent straining. The cut shows the vertical lateral stiffening and drums, with hoisting blocks, other details omitted.

The hoisting block has two sheaves, as shown in the cut. The chains are in two parts, each wound on separate parts of the drum; the winding running toward the middle, so there is no tendency to side pull either way, so the object lifted rises in a truly vertical line, a very important consideration in foundry work. The capacity of the hoisting trolleys is 100,000 lbs. each, but it is not expected that the higher speeds will be used with any loads near the full capacity. On the "far trolley," so called, is a separate drum and hoisting chain operated by a 5-H. P. Wenstrom motor, series wound, variable speed, fed by a cable that hangs in festoons on the side of the bridge, as may be seen in the picture. This auxiliary drum is very useful in handling lighter weights when the large drums are engaged.

The arrangement for moving the crane, as a whole, is operated by the 40-H. P. motors, and is located on the far side of the bridge as shown in the picture. This arrangement has two speeds, by which the crane may be traversed at 100 or 200 ft. per minute. On the operator's platforms are nine levers; six of these are for the hoisting trolleys, *i. e.*, two for hoisting or lowering; two for traversing and two for change of speed; the three remaining levers are for stop, start and change of speed of traverse of the whole crane. The above levers are, as far as possible arranged to move in the direction of the motion intended to be produced; so the first impulse of the operator's mind is in the right direc-

A full and free discussion of the present situation in regard to the settlement of car service was held and it developed a marked unanimity of opinion on the part of all those present in favor of adopting the mixed mileage and per diem plan, which had heretofore been recommended by the Committee of the American Railway Association, with some slight modifications.

Mr. C. H. Hudson, General Manager of the E. T., V. & G. Ry., some time since, in a communication addressed to the General Time Convention, had pointed out the difficulty in the way of the adoption of the "per diem" plan as then recommended by the committee. The average mileage per car per day on all roads in the United States, according to the best information that is to be obtained, is now about 24 miles. At the existing mileage rate of three-quarters of a cent per mile this produces an expense of 18 cents per day. Mr. Hudson argued that it would not be feasible for the railroads who were borrowers of equipment to go into any "per diem" plan, unless they could see that their average expense would not in any way be increased by so doing. In order to accomplish this, it becomes necessary to reduce the "per diem" to six cents per day, the mileage rate being reduced to one-half cent per mile. At those figures, the mixed plan will not involve any increased expense and will, no doubt, be more acceptable to a large number of roads.

These views originally presented by Mr. Hudson were fully discussed by the meeting in Buffalo and resulted in a general agreement of opinion on the part of those present, that the rates as suggested above would be equitable and should be recommended to the American Railway Association.

Another opinion that has heretofore been a stumbling block in the way of the general adoption of the mixed plan of car service was the question of co-operative line cars. It is customary for very many roads west of Chicago and St. Louis to receive large numbers of line cars during the greater part of the year and hold them in anticipation of shipments eastbound. The payment of "per diem" on such cars would be very burdensome and expensive, and this has stood in the way of the adoption of this plan by many roads so situated. After full and careful consideration of this point, the meeting concluded that it would be better to recommend that all such cars should not be subject to "per diem," but that settlement for them should be continued on a mileage basis.

The steadily increasing number of private cars and cars owned by firms or companies, other than railroad companies, was the subject of careful consideration. At present, as is well known, there are very many lines of cars in service running over different railroads in the country, on which the mileage at the present rate of three-quarters of a cent per mile is equivalent to a return on the investment of from 35 to 50 per cent. per annum. Such large profits for the use of cars have stimulated their production in a marked degree. Firms and companies controlling any considerable volume of freight find it for their interest to own the cars in which their business is carried and by so doing are, in very many cases, enabled not only to dictate to the railroad companies the rate of freight they are willing to pay, but also the rate of mileage they must have for their equipment. It has resulted not only that cars for the movement of live stock, dressed beef, and other freight requiring cars of special construction, are now wholly owned by individuals or private companies; but also a large number of such cars are being used by railroad companies for coal, coke and other coarse commodities. To such an extent is this now being carried that cars are being paid for by railroad companies in very many directions, when the cars owned by the companies which would be perfectly fit and suitable for carrying the business, have to stand on sidings. The Committee came to the conclusion that the only way to check this growing evil would be by a reduction of the mileage earnings on such cars, and after full discussion they came to the unanimous opinion that they would recommend to the American Railway Association that the mileage on all cars owned by individuals, firms and private companies, and also on co-operative line cars, should be reduced to one-half cent per mile, and that no *per diem* be allowed on any such cars. It may be urged that very many railroad companies have made long time contracts with individuals and special shippers in regard to mileage to be paid for the use of their equipment. Granted that this may be true, there is still no reason why the railroad companies, as a whole, should not agree and unite upon a general reduction in the mileage rate for such cars. It is certainly only by some such action that the present tendency on the part of shippers to insist upon the use of their own cars can be checked.

The above represents the main points of the discussion, after which the special committee of the American Railway Association held an executive meeting and agreed upon a form of report, which will be published and distributed to all railroad companies within the next few days. It was agreed by all that the present was a favorable time for the consideration of this question. There has probably not been in many years so great a demand for cars as existed during the past fall and the indications are that the railroad companies will have all they can possibly do with the existing equipment for months to come.

The general spread of the system of car service asso-

ciations at junction points and the application of car service rules at local stations on so many roads, it was reported on all sides, had produced most beneficial results. Cars have never been unloaded so promptly as during the past year and many roads reported considerable economy in switching and yard service as one of the results of the enforcement of these rules. At the same time, the complaint is general that as yet nothing has been accomplished by the railroad companies, either individually or as a whole, to prevent the misuse and diversion of foreign cars. Car service rules, when properly enforced, will release the loaded car without delay, but at present there is no incentive to any transportation man to expedite the return home of the empty foreign car.

It was the belief generally expressed by those at the Buffalo meeting that the operation of the "per diem" plan would be a long step toward the removal of this particular abuse. Even so small a sum as six cents per day, when multiplied by the large number of foreign road cars in use on almost all lines, would prove a very considerable incentive toward the establishment of such methods in the routine handling of empty cars as would bring about a prompt return in the proper direction of all foreign equipment.

The meeting was of the opinion that it would be desirable to bring about a general adoption of this mixed plan with the opening of the next fiscal year, July 1, 1892, and to enter into an agreement among all companies to try this method of settlement of car service balances for twelve months. It was suggested that it was not necessary that all roads in the United States should agree to this. Very many roads might be willing to try this experiment, provided the roads with which they have immediate connection or with which they had the greatest volume of interchange should agree to do likewise. It is proposed, therefore, by the Buffalo meeting to ask the managers of the various roads, first, whether they will be willing to adopt and try the "per diem" plan for one year from July 1 next, if all roads agree, and, second, if they will be willing to do so if certain of their connections would agree, and asking each road to name those of their connections with which they would be the most interested. It is hoped that the responses to this circular will be prompt and general, so that the matter may be fully condensed and put in proper form to be submitted to the coming meeting of the American Railway Association.

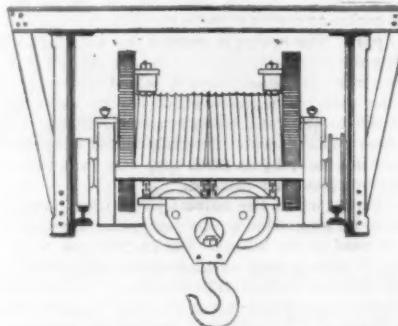
There were several minor points discussed at the meeting in regard to proper application of these rules, but the above is a summary of the more important action taken.

The Stewart Avenue (Chicago) Interlocking.

In our issue of April 24, 1891, appeared a plan of the very complicated system of railroad crossings in Chicago known as the Stewart avenue, the Canal and Sixteenth street and St. Charles Air Line crossings. There, within an area included in a circle with a radius of less than 1,500 ft. is one of the busiest and most complicated networks of railroad crossings in the world. The best method of dealing with this locality has been under consideration for a long time, and it is now proposed to operate the crossings by three interlocking towers, with the necessary signals and other safety equipment. The contract for the Stewart avenue crossing was recently let to the Union Switch & Signal Co., and we show a plan of the tracks and arrangement of signals for that situation. The following description of the plant is contained in a letter written to us by Mr. George H. Paine, General Agent of the Union Switch & Signal Co., and as we cannot easily improve upon his description we shall not attempt to paraphrase it. The machine which he mentions is, it will be understood, the Westinghouse electro-pneumatic apparatus, which has often been described in our columns.

There are 84 signals on the plan, 37 single switches, 22 double slips, 22 movable frogs, all of them worked from a machine having 48 working levers and six spare spaces. If the attempt were made to do this work with a mechanical machine it would require, according to American practice, a machine of 187 working levers, which would occupy a floor space in the tower of 14 x 77 ft. If a mechanical machine of the English pattern, worked out according to their ideas, were used, there would be 243 working levers in it, which would require a floor space of 17 x 93 ft. There is no practicable place on the ground for putting a tower of that size. The pneumatic tower will be only 34 x 12 ft., which gives a large amount of extra room, as the machine will occupy a floor space of only 21 x 5 ft. There are on the plan 197 signaled routes, and in addition to the routes which are signalled there are 103 for which there are no signals, but which are possible. There will be nearly 10,000 ft. of detector bars required, which, according to the best of my knowledge, is the largest amount ever worked from any one machine.

It will, I believe, be understood that great care has been used in designing this work, which has to a large extent been done by Messrs. Corbett and Wallace, of Chiesgo. The plan is the outcome of several years work by the most competent men on the different railroads concerned, and it is hoped and believed that it will to a large extent simplify and make more safe the operation of this most difficult system of tracks. I would like to



tion. The rheostat and switches are placed in a box on the side of the bridge.

Special remarks should be made on the clutches in use on these cranes. The ordinary form of conical clutch consists of a conical piece, usually with a wood face, running in a metal flange of a corresponding shape, so that when pressed together, friction on the conical surface holds them. In cranes with even as slow a motion as five feet per minute a very gentle start or stop is frequently of great importance. To accomplish this it is necessary to let the clutches slide a little before taking a firm hold, the pressure uniformly increasing until a firm hold is secured, as is done in the case of a cable car grip. It has been found that with a conical clutch the heat developed by the friction of first pressure and sliding caused the outer metal part to expand to an increased diameter, thus again loosening the clutch. This either checked the increasing speed of motion or even allowed a backward movement, that in handling delicate sand molds might result in serious consequences. This necessitated the designing of a clutch in which a change of shape within reasonable limits would not affect its holding power whether the parts were firmly bound and moving together, or whether one part produced a constantly accelerating or retarding effect on the other. This result has been very successfully secured.

Car Service—Per Diem and Mileage.

A meeting of the Committee on Car Service of the American Railway Association was held at the Iroquois Hotel, Buffalo, on Thursday, Jan. 21, the following members being present:

Mr. Theo. Voorhees, General Superintendent, N. Y. C. & H. R. R., Chairman; Mr. S. M. Prevost, General Superintendent Transportation, P. R. R.; Mr. H. F. Royce, General Superintendent, C. R. I. & P. Ry.; Mr. W. H. Canniff, General Superintendent, L. S. & M. S. R. R.; Mr. C. H. Hudson, General Manager, E. T. V. & G. Ry.; Mr. W. G. Collins, General Superintendent, C. M. & St. P. Ry.; Mr. F. Huger, General Superintendent Transportation, representing Mr. J. H. Sands, Vice-President and General Manager, N. & W. R. R.

The Per Diem Committee of the International Car Accountants' Association held a meeting at Buffalo on the previous day and joined with the Committee of the American Railway Association in a general discussion of the "per diem" question on the 21st. There being present from the Car Accountants' Committee the following gentlemen: G. S. Russell, C. A., B. C. R. & N. R. R., Chairman; H. Sleight, C. A., Vandalia Line; A. Hale, C. C., Car Record Office, P. R. R.; F. E. Higbie, G. C. Agt., C. R. R. of N. J.; Asa P. Blakeslee, G. C. Agt., Lehigh Valley R. Ry.; W. W. Wheatley, C. A. West Shore R. R.; W. W. Halsey, W. N. Y. & P. R. R.; T. F. Brennen, G. C. Agt., B. R. & P. Ry.; H. R. Payne, Secy., Union Tank Line.

give you an idea of the number of trains using this crossing and adjacent switches in the course of 24 hours, but am sorry to say that the figures are not available.

At the Chicago River, where the Pittsburgh, Ft. Wayne & Chicago crosses, the compressed air and the electric cable will be run under the river, very much as was done at the large plant put in for the Chicago & Northern Pacific.

The large letters shown on this plan are for the purpose of more plainly indicating the routes to trainmen, and will probably be used on the plan when the instructions for the operation of the plant are issued.

All the power for the plant will be derived from two 75-H.P. boilers, situated between Elgin and 22d streets. The power house will be 35 x 62 ft., with a brick stack 65 ft. high. It will contain besides the boilers two 25-H.P. Westinghouse engines for the operation of two 125-light dynamos of 110 volts potential and two 14 x 16 air compressors. The main air pipe will be 3 in. in diameter and will be, together with the wires, buried underground. Each signal will be illuminated by a 16 candle-power electric light and the tower and power house will also be lit by electricity. Each of the main tracks will have a track circuit annunciator, and wherever necessary on side tracks a push button annunciator with recording dials in the tower. The dispatcher will be on a raised platform in a bay window and in such a position that he can see to all parts of the system. The tower will be of brick, with a slate roof, and built on the slow combustion principle, and will be heated by steam derived from the power house. The electric current which will be used for controlling the movement of the switches and signals will be taken directly from the dynamos in the power house and pass through a storage battery in the signal cabin.

There will be a very considerable saving in the cost of operating the pneumatic machine over the amount which would be required to operate a Saxby & Farmer machine of 187 levers. It is impossible to state how much this will be, but it is known to amount to a very considerable sum, and in the present case the saving will be very considerably increased from the fact that the signals are lit by electricity and will not require the attendance of lamp men.

The St. Paul-Minneapolis Demurrage Association.

The Terminal Dispatch Association, having jurisdiction over the movement of bulk freight in Minneapolis, St. Paul and the Minnesota Transfer, is composed of the following roads: Great Northern, Northern Pacific, Chicago, Milwaukee & St. Paul, Chicago, St. Paul, Minneapolis & Omaha, M., St. P. & Sault Ste. Marie, Minneapolis & St. Louis, St. Paul & Duluth, Wisconsin Central, Eastern Railway of Minnesota, Minneapolis Eastern, Railway Transfer of Minneapolis, Minnesota Transfer Railway.

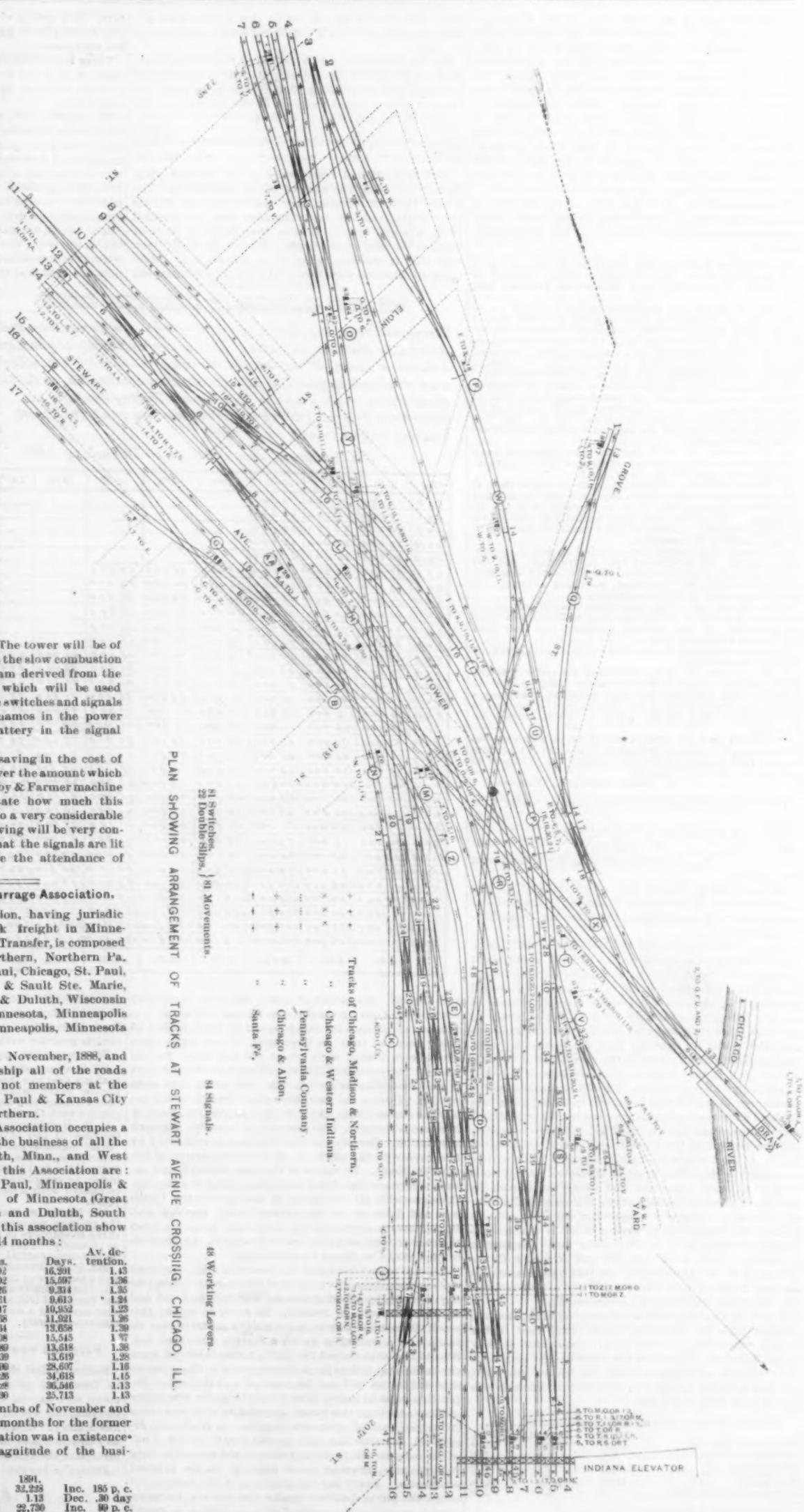
This Association was formed in November, 1888, and originally embraced in its membership all of the roads of that section. Two roads are not members at the present time, viz., the Chicago, St. Paul & Kansas City and the Chicago, Burlington & Northern.

The Lake Superior Car Service Association occupies a similar position with relation to the business of all the roads having terminals at Duluth, Minn., and West Superior, Wis. The roads forming this Association are: St. Paul & Duluth, Chicago, St. Paul, Minneapolis & Omaha, Northern Pacific, Eastern of Minnesota (Great Northern), Duluth & Iron Range and Duluth, South Shore & Atlantic. The records of this association show the following results for the past 14 months:

	Cars.	Days.	Av. detention.
November, 1890	11,501	16,268	1.43
December, 1890	11,392	15,597	1.36
January, 1891	6,995	9,314	1.35
February, 1891	7,701	9,613	1.24
March, 1891	8,917	10,952	1.29
April, 1891	9,468	11,921	1.26
May, 1891	9,894	12,858	1.39
June, 1891	11,308	15,545	1.77
July, 1891	9,699	13,618	1.38
August, 1891	10,639	13,619	1.28
September, 1891	24,500	28,607	1.16
October, 1891	30,126	34,618	1.15
November, 1891	32,226	36,546	1.13
December, 1891	22,730	25,713	1.13

Comparison is limited to the months of November and December of 1890 and 1891, those months for the former year being the first that the association was in existence. The following figures show the magnitude of the business and some of the results:

	1890.	1891.	Inc.	185 p. c.
Total cars, November	11,302	32,226	Dec.	.30 day
Average detention, November.	1.43	1.13		
Total cars, December	11,392	22,730	Inc.	.30 p. e.
Average detention, December.	1.36	1.13	Dec.	.28 day



Comparative data of the work done by the Minneapolis-St. Paul Association is not nearly so complete as the above, the principal reason being that, while all commodities are subject to the Lake Superior Association, at St. Paul on account of two roads being outside the Association, a number of articles are not subject to car service and trackage charges. Then the number of these articles has been changed from time to time at the request of association roads which compete with non-association roads. Again in 1890, a car of a non-association road was not subject to the rules of the Association at any time, while now it is subject as soon as it reaches the tracks of one of the association lines.

In Minneapolis nearly 50 per cent. of the business is grain, handled under the following special rules, which are necessitated by the peculiarities of the Minneapolis market:

On and after Sept. 15, 1891, the rules for disposition of and handling wheat, flax and coarse grain received at St. Paul, Minneapolis and Minnesota Transfer will be:

1. For all wheat, flax and coarse grain received on or before 9 a. m. disposition shall be given not later than 4 p. m. same day; provided, inspection on same is reported at the office of chief train inspector before 12 m.

2. On all cars loaded out of an elevator, and inspected (if same are to be inspected) up to 6 p. m., disposition shall be given not later than 4 p. m. the following day.

3. If disposition is not furnished as above, cars will be subject to a trackage and car rental charge after 4 p. m. day of arrival, or 4 p. m. following day if loaded at an elevator as follows: \$2 per car per day for the first five days; \$4 per car per day for each succeeding day or fractional part of a day.

4. At elevator or mill, having more grain on track than it can receive in one day, shall be subject to a trackage and car rental charge, as in rule 3.

5. When an elevator has more grain on track than it can unload in two days, grain receivers shall be notified that orders sending cars to such elevator will not be accepted. The notice to be signed jointly by the Elevator company and Chairman of this Association and posted in the Chamber of Commerce.

6. If local freight agents are notified on day of inspection, one day will be allowed free of trackage and car rental on cars of grain received from country stations, on which re-inspection is called, provided a change in grade is allowed by the state inspector.

7. On all cars for which disposition has not been given, as above, a notice or bill for trackage and car rental shall be presented by the railway company not later than 3 p. m. the following day.

8. Agents shall not accept disposition until trackage and car rental is paid.

9. On all cars of grain, delivered for transfer to the mills, and not unloaded 36 hours after being placed on transfer track (Sundays and legal holidays excepted), a charge for trackage and car rental will be made as in Rule 3, to be paid by the party to whom grain is delivered.

10. On all cars of grain ordered to an elevator and "run through" and not unloaded on account of no orders having been furnished elevator company, a charge of \$3 per car per day will be made.

ROBT. DUDGEON, Chairman.

From July 15 to September 15 the charges under Rule 3 were:

\$1 per car per day for the first three days.

\$3 " " " next two "

\$5 " " for each succeeding day or fractional part of a day.

The rate, which was put into effect on Sept. 15, was made necessary by the enormous crop to be handled and the necessity for an additional incentive for immediate unloading of cars.

The railroad commissioners of the state of Minnesota in July addressed a circular to the general managers of the railroads, "with reference to a uniform and thorough system for the distribution of cars among the several stations and shippers upon their respective lines of road." This circular calls attention to the shortage in previous years of transportation facilities, and refers to the rules, under the existing laws, for furnishing cars, calling particular attention to the prevention of discrimination, and further suggests that instructions be issued to agents for their guidance. The 6th suggestion is: "A demurrage charge should be rigidly collected when cars are held an unreasonable time for loading or unloading." All of these causes have more or less influence in rendering the records of less value from a comparative standpoint. It must not be too hastily assumed that the time consumed in handling grain is excessive. All grain is subject to state inspection and every car is sold by sample, exposed on the floor of the Minneapolis Chamber of Commerce. After state inspection, sampling and sale of each car, disposition by written order is made, sending it to elevator, mill or connecting line. Disposition is made up to 4 p. m. of each day and is filed with the Chairman of the Association. As this consumes on an average 20 hours, only about a day and a half remains for switching, transferring and unloading.

It will be noticed, in the accompanying table, that the average time for unloading grain is $2\frac{1}{2}$ days. Other subject commodities, 0.95 of a day; non-subject commodities, 3.20 days. This is for the three busiest months of the year, and as compared with the entire year 1890, shows a decrease in time for both subject and non-subject of more than half a day.

Freight Car Detentions at Minneapolis and St. Paul.

	Oct. '91	Nov. '91	Dec. '91
Cars subject to rules.....	45,116	36,296	40,918
Average detention, days.....	0.94	0.98	0.93
Cars exempt.....	1,389	1,392	1,261
Average detention, days.....	3.11	3.12	3.37
Cars, grain*.....	15,087	14,551	15,290
Average detention, days.....	2.50	2.50	2.50

* Not included in first item.

The estimated time, prior to this organization, is seven

days. No reliable records as to this, however, are obtainable, although this is considered a very conservative estimate.

For the 12 months of 1890 the grand total of cars handled was 491,886; those subject to the rules were detained 151 days, and those exempt 3.80 days on an average. In October, 1890, a record was kept of the non-subject cars in each of the two cities, as follows:

St. Paul, 126 cars; 848 days total detention; average, 6.7 days. Minneapolis, 171 " 2,379 " " " 13.9 "

Both shippers and receivers favor the present plan, thereby indorsing the work of these associations. The former favor it because they receive prompt pay for their grain, and the latter because they are enabled to do a much larger business than formerly without increase in capital invested. It can be easily seen how this is possible when it is known that before these associations were formed the yards in Minneapolis

cars. This system of patrol has been found to be preferable to the plan of having reports furnished by agents of the companies.

There is no chance for much loss of time after the destination of a car has been given, as a road must make prompt transfers to other roads of both loaded and empty cars.

On April 23, 1891, a transfer time table was put into effect as an experiment, and it has proved so effective that the original card is still in use. Despite the limited and awkward terminal facilities in Minneapolis and the immense volume of traffic interchanged, the system has been an unequalled success. The December, 1891, report shows a total of 74,415 cars handled during that month without delay or friction between the roads. There were 2,688 transfers made, only 122 of which, less than 5 per cent., were behind time. This is remarkable when it is remembered that the plan is a comparatively new one, and that the transfers are made by the yard crews and through busy and crowded yards. Prior to the formation of the Terminal Dispatch, transfer tracks were continually blocked, and it was frequently impossible for weeks to move cars on certain of the tracks. Then, too, when cars were delivered to connecting lines without previous notice or arrangement the receiving line would refuse to receive cars for certain industries, saying they (the industries) had already too many cars on track. This added to the confusion and aggravated the delays, so much so that when the industry had caught up with its unloading, the cars were frequently so blocked in that two or three days would elapse before more could be delivered. Under the present system there has been no delay to cars, nor have there been any blockades in the yards.

The managements of the roads are heartily in accord with the Association, and co-operate faithfully in all its work. They recognize the fact that it is indispensable in securing prompt loading, unloading, disposition and switching of cars enabling them to obtain the maximum use of their rolling stock and at the same time minimizing repairs as well as yard expenses, by preventing the repeated and unnecessary handling of cars. In short, by centralizing the authority in matters pertaining to car service and car movement in the Associations it is the unanimous opinion that greater benefits

are secured to both the shipper and the carrier. Mr. Robert Dudgeon is the chairman of the Minneapolis-St. Paul Association and Mr. James Kelley occupies similar position with the Lake Superior Association.

We append the views of a few large grain dealers:

W. F. Commons, of Commons, Bassett & Co., states that his firm has had as many as 600 cars on track in former years, whereas under the present rules they rarely exceed two days' receipts, 50 cars. They are highly pleased with the change.

C. W. Harrington, of Van Dusen, Harrington & Co., testifies to the benefits derived by stating that their "Star" elevator has had better car service than at any other period of its existence. A recent comparison developed the fact that there were only required at that house, to complete shipments delayed for cars, 7 cars as compared with a shortage of nearly 300 cars in previous years.

Mr. Martin, of Martin & Wyman, says that owing to the prompt movement unloading they now make returns to shippers in three or four days, instead of weeks as formerly. They are enabled to double their business on the same capital.

Mr. Soule, President of the T. L. Soule Elevator Co., and a member of the commission firm of O. P. Coster & Co., emphatically states that the benefits derived from the Terminal Dispatch Association are incalculable. He also says that a suspension of its rules would paralyze business entirely.

Proposed New Formula for Yellow Pine Posts.*

Believing that the formula of C. Shaler Smith given in Trautwine gives too large values for yellow pine posts, and having the usual objection to the "step" formula, the writer, for his own information and use, has taken the trouble to plot the values of all the tests on full-size sticks made at the Watertown Arsenal and printed in the Government reports.

From the drawing herewith the straight line formula

$$S = 5,000 - \frac{43\frac{1}{2}}{d}$$

* Copyright 1892 by James H. Stanwood.

was easily deduced, which represents the average of all the tests.

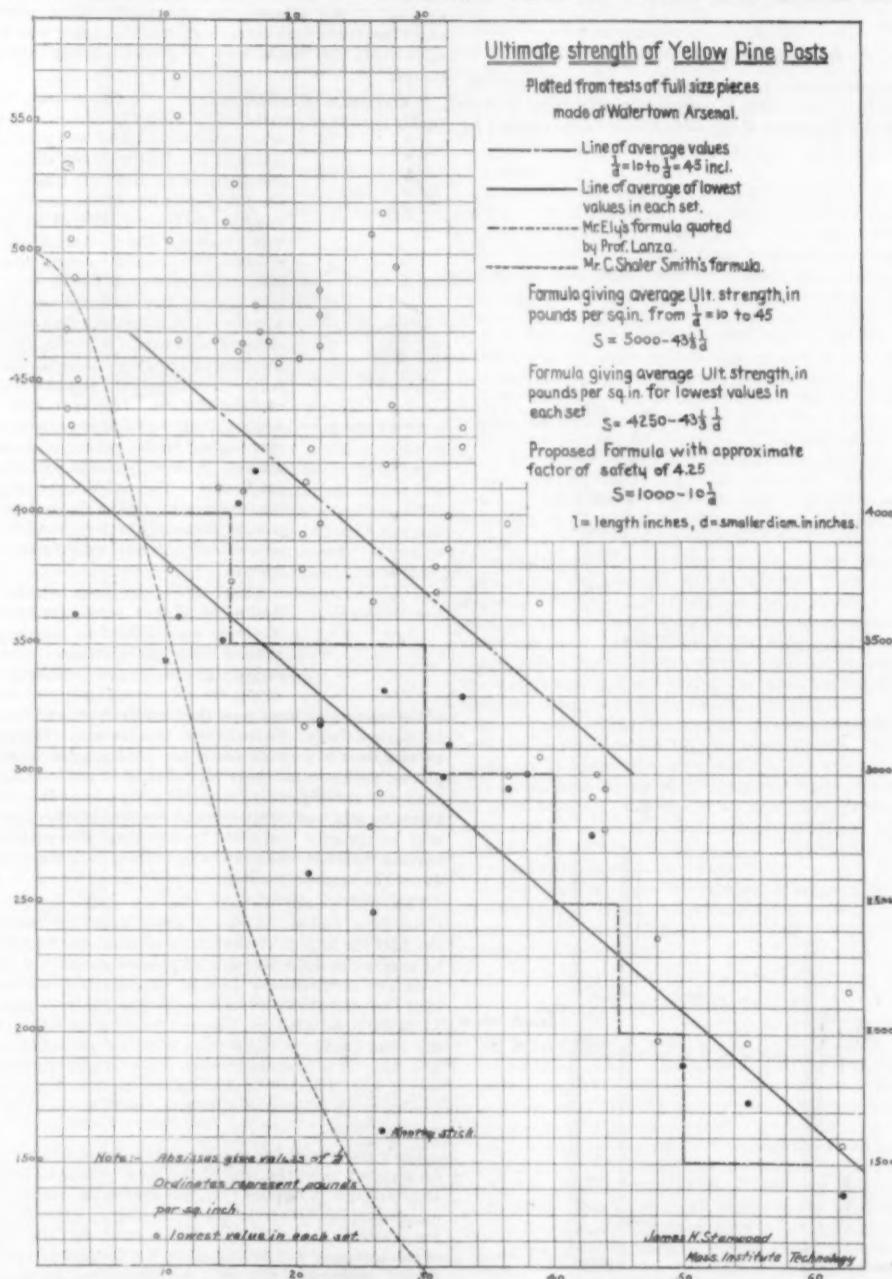
For the average of the *lowest* values in each set of tests the formula

$$S = 4,250 - 43\frac{1}{4} \frac{l}{d}$$

was found. The line representing this formula chanced to be parallel to the first one. With this latter equation as a basis the working formula

$$S = 1,000 - 10 \frac{l}{d}$$

gives a factor of safety of 4.25 approximately. This very simple equation is easily memorized and by its use the safe



load for a yellow pine post may almost instantly be worked out "in the head." For the sake of comparison the formulas of C. Shaler Smith and Mr. Ely have been plotted.

For those who prefer not to depart from the strict column formula of the form

$$S = \frac{K}{1 + \frac{1}{\alpha} \frac{l^2}{d^2}}$$

the following:

$$S = \frac{4000}{1 + \frac{1}{2,500} \frac{l^2}{d^2}}$$

may be used, which, if plotted, will be found to represent the average of the lowest values.

In each of the above formulas
 l = length in inches.
 d = smaller diam. in inches.

From the expression

$$S = 1,000 - 10 \frac{l}{d}$$

the table of safe loads has been computed.

Trusting that this will be of use to others it is respectfully submitted to the profession.

Since making this drawing the recent experiments of Kirkaldy on wood columns of fairly large size have been applied to the proposed formula and found to agree quite well with it.

JAMES H. STANWOOD, S. B.,
Instructor in Civil Engineering,
Mass. Institute of Technology.

JAN. 15, 1892.

Uniform Standard Time.

What follows is the chief part of the report of the Special Committee on Uniform Standard Time, submitted at the recent Annual Meeting of the American Society of Civil Engineers.

The movement for placing the reckoning of time on a scientific basis was first considered by the American Society of Civil Engineers in 1881, when this Committee was appointed to carry out the wishes of the Society with respect thereto. . . . The subject of uniform standard time for railroad, telegraph and civil purposes generally was submitted for consideration on June 15,

1883, that Congress had passed a joint resolution authorizing the President to call an International Conference to fix on a prime meridian to be used in common throughout the world for reckoning time and longitude.

At the annual meeting in January, 1884, the Committee reported that the railroad authorities had met at Chicago in the previous October and agreed to adopt the system of standard time recommended by the Committee, and that the new system had actually gone into effect throughout the country generally.

In June, 1884, the Committee made certain recommendations respecting another reform in time-reckoning, the notation of the 24 hours in a simple series, abandoning the expressions *ante* and *post meridian*.

At the annual meeting in January, 1885, the Committee reported that an International Conference had been held at Washington in the previous October; that 20 nations had been represented by delegates and that they had with unanimity agreed on the meridian of Greenwich as the prime meridian for the world, and had passed resolutions in harmony with and confirming the principles of time reckoning favored by the Society.

At the summer convention, held at Denver, in July, 1886, it was announced that the Canadian Pacific Railway had been opened, and that the 24-hour notation had been adopted in operating the line from Lake Superior to the Pacific Coast. The Committee likewise reported that the new notation had been adopted on the telegraph lines extending from England to Egypt, South Africa, India, China, Japan, Australia and New Zealand.

At the annual meeting in January, 1888, the Committee reported that the 24-hour notation had been adopted on the Intercolonial Railway, extending from Quebec to Halifax, and that the managers of that line had placed at the service of the Committee a number of letters respecting the new system, establishing beyond all question that wherever the 24-hour notation had been tried it had proved to be advantageous to railroad service and the public. The Committee was likewise in a position to announce that standard time had been adopted throughout the Japanese Empire on Jan. 1, 1888.

At the annual meeting in January, 1889, the Committee submitted two important letters from the managers of the Canadian Pacific & Intercolonial Railway, setting forth that the new notation had been thoroughly tested for two or three years on 3,057 miles of railroad, that it had been introduced with care, that the public readily accepted the change, that no objections to it had been heard in any quarter, that its extreme simplicity facilitated the movement of trains, and that the impossibility of errors promoted the safety of the public.

The Committee reported at the annual meeting in January, 1890, that up to date between 500 and 600 prominent men had been heard from respecting the 24-hour notation, and of these an exceedingly small percentage were adverse to its early adoption. Among those in favor of its adoption were 123 presidents, vice-presidents and managers, 193 superintendents and traffic managers of railroads. The Committee likewise reported that the time reform movement was attracting much attention in Europe.

At the annual meeting in January, 1891, the Committee reported that railroad men continued to be heard from, and that up to date a total number of 403 presidents, managers and others in the highest official positions had communicated directly with the Society, expressing themselves in favor of the adoption of the 24-hour notation. As the aggregate length of railroad with which these officers are connected is about 140,000 miles, it appeared obvious that the proposal to adopt the 24-hour notation meets with general assent, that there is no insuperable obstacle in the way of its introduction throughout North America, and that the change may be effected at any time by joint arrangement among railroad men.

The committee reported the adoption of the 24-hour notation throughout the Indian Empire and on the short railroad mileage in China. Within the year the mileage of railroad on which the new notation had been permanently introduced had increased from less than 4,000 miles to over 20,000.

1892.

The Committee has now to report that during the past year the advance of the movement has been most marked in Europe. For a number of years back the question has been under discussion. The most remarkable speech recorded is that of the late Count von Moltke, in the Imperial German Parliament, at the sitting of March 10. This, perhaps the last public utterance of the illustrious and venerable statesman-soldier, from the influence it has had in Europe, and will continue to have throughout the world in extending the advantages of a movement in which this Society has taken a leading part, must be of interest to every member. A translation, somewhat abbreviated, is appended. [We do not print Von Moltke's speech. It urges standard time for military and civil reasons.—EDITOR.]

By the latest information from Europe it appears that the Belgian Minister of Railroads, Posts and Telegraphs has issued a notice to all the services connected with his department announcing that from May 1, 1892, standard time will be used. He invited all the railroad companies to adopt the same reckoning, and asks his colleagues in the government to issue directions for all services to

the Committee reported at the annual meeting in Jan.

conform to the new reckoning in their relations with the public. The government of Holland has likewise taken decisive action and authorized the adoption of standard time, based, as in Belgium, on the zone of the Greenwich meridian. This decision will come into force on May 1, 1892, for the interior service in Dutch territory. From April 1 next standard time based on the reckonings of the meridian 15 deg. east will be introduced in the states of Bavaria, Wurtemburg, Baden, Alsace and Lorraine. Since Oct. 1, 1891, Austria-Hungary has by official authority adopted standard time in all its public services. In Prussia there has been discussion and much difficulty owing to a reactionary movement, but a change followed the views expressed in the Reichstag by the late Field Marshal Von Moltke. And now it is by Imperial direction that the adoption of standard time is proposed. It is not unlikely, therefore, that the proposition will be finally resolved upon at the next meeting of the chamber.

It is evident that Europe is now making the first great steps in time reform, which America made in 1883, in introducing standard time into general use. In the second important step, the adoption of the 24-hour notation, this country is somewhat anticipated by India, and we need not be greatly astonished to hear of a rapid development of the reform in Europe once the first step is taken. Already in the Belgian parliament a prominent member has moved the government to introduce the 24-hour notation.

It cannot but be a matter of congratulation to the American Society of Civil Engineers that these important movements for placing time reckoning on a proper scientific basis, make progress in so many quarters. This Society has been one of the first and most active movers. It is recognized to have greatly stimulated the movement, not in this country alone, but throughout the globe, and it must eventually receive the fullest credit for the action which it has taken from the beginning.

[The following preamble and resolution were adopted by the Society in the Annual Meeting.]

Whereas the several reports of the Special Committee on Uniform Standard Time establish that the movement for reforming the time system of the world has made substantial progress in the three continents of America, Asia and Europe; and

Whereas the railroad companies of America were the first to recognize the value of the reform and bring into practice the hour zone system; and

Whereas it appears that a large majority of prominent railroad men are in favor of the early adoption of the 24-hour notation; and

Whereas it would be advisable to bring the new notation into use in railroad administration throughout the country within the present year; and

Whereas, the shores of the New World were first sighted by Columbus on October 12, 1492; and

Whereas; the 24-hour notation is essentially Italian in its historical origin and it would be a graceful compliment to the land which gave birth to the illustrious discoverer to adopt the new notation on the four hundredth anniversary of the day upon which he first saw land appertaining to the Western Continent:

Be it therefore Resolved, that such steps be taken, as the Committee on Standard Time may deem necessary, to invite all the railroad companies of the United States, Canada and Mexico, to adopt the 24-hour notation on the twelfth day of October next.

Mozier's Three-Position Semaphore.

The accompanying drawing shows the construction of a semaphore recently devised by Mr. A. M. Mozier, Superintendent of the Chicago & Erie, which is in use as a block signal on the New York, Pennsylvania & Ohio, which road Mr. Mozier was connected with until a few months ago. The illustration also shows the connection to the telegraph office, together with an outline of the safety levers by which the operator controls the blade. This safety lever is also the invention of Mr. Mozier, and was described in the *Railroad Gazette*, of Jan. 3, 1890. In brief, it is an electrical cut-out, connected with the lever for pulling the signal, and so arranged that whenever the lever is at any other position than "danger" (to stop trains) the operator is unable to work his Morse key, and thus is unable to acknowledge a train order.

The semaphore is used under the rules which were lately adopted on the New York, Pennsylvania & Ohio, and which were printed in the *Railroad Gazette* of Oct. 7 last, and its special feature is the arrangement for throwing the arm up to an angle of 45 degrees for the caution position.

The counterweight has a slot, between which two roller bearings are fixed, so that its movement must always be vertical. It is attached to the blade by two chains of equal length, one fastened on each side and about 8 inches from the pivot. The blade is itself weighted so as to drop from the caution position to the horizontal position by gravity, while the counterweight prevents further descent. The Erie signals are ordinarily erected with hollow posts, within which the signal lamp is raised by means of a chain running over a pulley into the office. The signal lever inside the office is so adjusted that its movements are the same as those of the signal blade: pulling the handle down places the signal at all clear, and pushing it up places it in the caution position. The key circuits are cut out while the signal is either at all clear or caution.

Twenty-five of these signals have been in use for six months, and 110 more have been ordered, the extension of the block system throughout the lines of the New

York, Pennsylvania & Ohio having been decided upon several months ago. The Chicago & Erie will also soon be blocked.

Officers of the Erie not only express great satisfaction with their block system, but think that they have already seen an incidental benefit in the greater care with which enginemen handle their trains. The necessity of keeping a sharp and incessant lookout for caboose lights when running at night being very materially relaxed by the use of the block system, it is believed that they keep better watch of their own trains and detect hot boxes, fallen brake beams, parted couplings and other dangerous circumstances more promptly and surely than before.

Railroad Projects in Costa Rica.

The outlook for a transisthmian railroad across the Republic of Costa Rica is sufficiently promising to warrant a consideration of the advantages to be secured by

the large cities in the central plateau sell as high as \$500, and even \$800, an acre.

Formerly the only port of Costa Rica was Punta Arenas, on the Pacific Coast, but a few years ago a railway was opened from Limon, on the Caribbean Sea, to San José, the capital, and an additional duty of 5 per cent. was imposed upon all goods passing through Punta Arenas, with the purpose of increasing the importance of the port on the Atlantic side. In spite of this the exports last year from Punta Arenas were larger than from Limon, the reason being that excellent wagon roads to the Pacific enable the teamsters to successfully compete with rail carriage, in addition to which the dryness of the climate on the mountainous western coast prevents that deterioration of the coffee which results from the humid airs of the low-lying Atlantic plains.

It may seem strange that in a region where a large traffic is already carried on by means of cart roads, and where the total lineal distance from coast to coast is only 103 miles, the construction of railroads has been so long delayed; but the reason is obvious from an examination of Mr. Merivale's report. The Central American range of the Andes courses through Costa Rica, rising between the central plateau and the Pacific Ocean to a height of over 3,000 ft. The western slope of this range is broken into a number of irregular valleys, and is furthermore gullied by an infinitude of deep ravines. The cart road has avoided these by climbing at once into the higher lands, where a railroad cannot follow without excessive gradients. The whole country is also overgrown with a dense tropical jungle, through which railroad reconnaissance is a matter of extreme difficulty.

After trying to keep within the limits of 3 per cent. grades Mr. Merivale was obliged to secure permission from the Government to use steeper grades, or else condemn the route, which, according to the terms of the concession must pass through the towns of Escas, La Garita, Grecia, Naranjo and San Ramon. The plans as now drawn provide for 8 per cent. grades in many places, with several short stretches of 12 per cent. The road will consequently be operated by a combination of adhesion and rack systems, and the cost of construction will be greatly reduced by avoiding the numerous ravines which would have to be bridged on a route lower down the mountain sides.

This line passes through the best coffee country in Costa Rica, and as this lies in a belt reaching throughout half the length of the proposed road, the traffic will be nearly the same whether shipments abroad are made from Puntas Arenas or Limon. Mr. Merivale estimates that the annual export and import traffic will amount to 50,000 tons, with an average haul of 50 miles, and the local traffic to 26,000 tons, with an average haul of 20 miles. It is proposed to run three freight trains each way a day, the duty of the engines on the 8 per cent. grades being calculated at 60 tons, with a speed of 6.2 miles an hour.

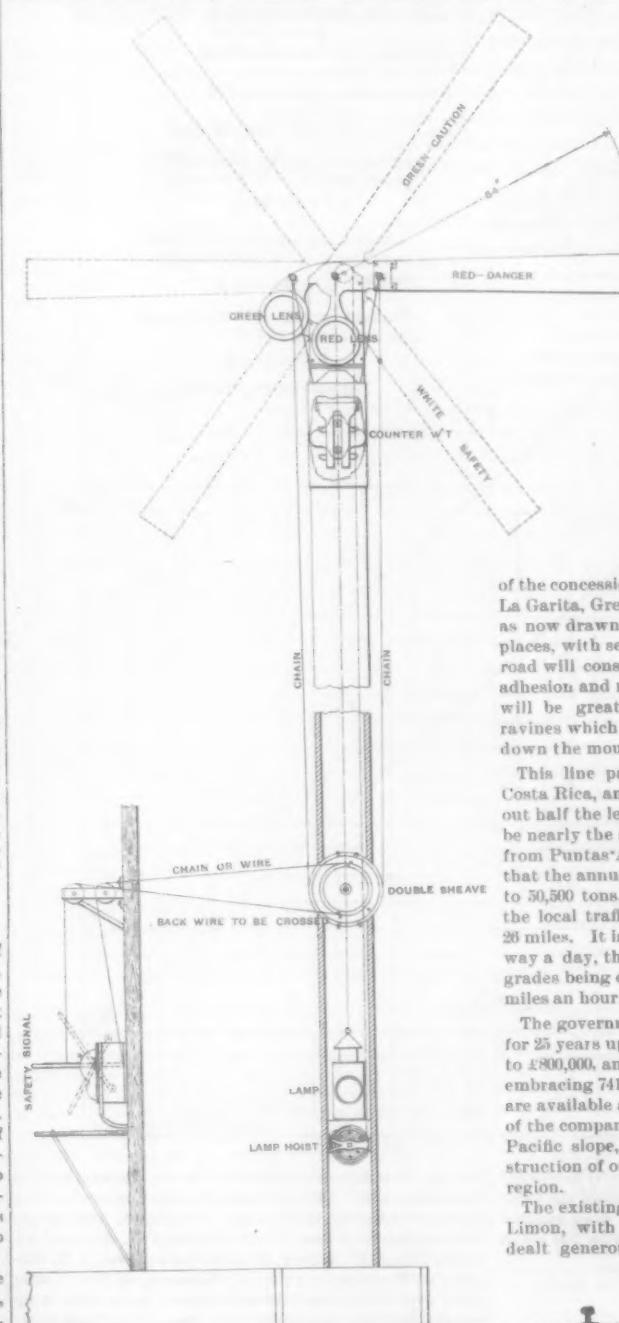
The government has given a guarantee of five per cent. for 25 years upon the cost of the road, which is limited to £800,000, and besides this, has granted a tract of land embracing 741,000 acres. Unfortunately, no public lands are available along the line of the road, but the grants of the company will be located on the fertile and healthy Pacific slope, and this will doubtless lead to the construction of other roads to develop the resources of the region.

The existing Costa Rica Railway, from San José to Limon, with a branch to Alajuela, has always been dealt generously with by the government, and Mr.

Minor C. Keith, who secured the concession and built this road, has now petitioned for a subvention of £100,000 to build another line northward from the capital, through the rich San Carlos district to the Nicaragua

Canal. It would seem that the government was favorably disposed toward this project, and it is also reported that it will loan the Costa Rica Railway Co. an additional £100,000 to carry out further improvements on its present line. The San Carlos project will be of great benefit to Costa Rica, and it is likely that rates on this route will be very low since the construction of the proposed Ochon dam will afford competitive slack water navigation on the Rio San Carlos for a distance of over 40 miles southward.

With the development of the San Carlos region and of the Pacific slope by means of railroads, together with the advantages of a continuous route from ocean to ocean, Costa Rica will make rapid commercial advancement. Her credit has always been maintained at a high standard, and her revenue invariably exceeds her expenditures. It is also noticeable that she keeps aloof from the broils which so often desolate Central America, and many Americans and Englishmen have already acquired



Mozier's Three-Position Semaphore.

coffee estates and have settled permanently in the country.

A Portable Drilling Machine.

We illustrate herewith a new drilling machine specially designed by George Burnham & Co., of Worcester, Mass., for railroad, bridge and general structural purposes.

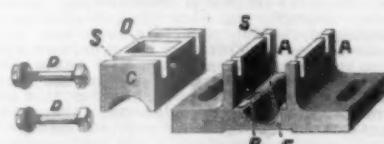
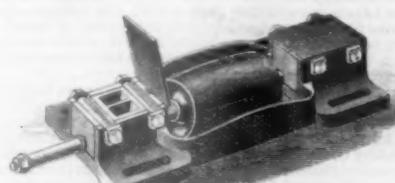


ing the return of drill. The machine is provided with a tool grinding attachment whereby the drills may be at all times kept to a good working condition without traveling to the grindstone. The illustration shows the machine fitted with a clamp for holding a rail for drilling. This clamp can readily be removed and the machine made ready for other styles of work. It can be set up on a work bench and made use of as a bench drill. Wheels 6 in. in diameter and 2½ in. face are provided as shown to make the machine portable. It weighs some 200 pounds.

The White Journal Box.

The cuts herewith show a recent improvement in journal boxes, designed to facilitate proper adjustment and providing for a more perfect and continuous lubrication than is practical in journal boxes as ordinarily made. The Franklin Institute of Philadelphia has recently awarded the Longstreth silver medal of merit for this invention.

Briefly, the improvements consist in making the walls *A* of the casting to extend up to the height of the top of the cap box *C*. These walls being planed through longitudinally the cap is fitted between them. To secure the upper or cap box, instead of using bolts or screws to draw it down in the direction of the shaft, it is clamped in position by bolts *DD*, laid in grooves *S*, cut transversely to the axis of the shaft across the top of the cap and through the side walls. By tightening these bolts the walls are drawn together, clamping the cap box firmly between them. A large oil chamber *D* is provided in the upper cap. The packing of paper or wood usually found in the ordinary journal box is entirely dispensed with here, thus leaving room for a strip of wicking *E*, one edge of which comes in contact with the shaft for lubrication and the other edge connects with an oil well *B*. Channels are provided in the casting for carrying any excess of oil back to the well. It is claimed that this journal box can be adjusted to the



shaft with accuracy in one-tenth of the time required to properly adjust a journal box of the usual type. This is accomplished by thoroughly oiling the shaft where it enters the box, and placing the cap in position where it seats itself upon the oil in accurate adjustment; then by tightening the bolts immediately the cap will be rigidly secured in its proper place. Strain on the bolts cannot affect the adjustment of the cap, which is evenly separated from the shaft by the film of oil. Experience has shown that the clamping of a journal box in this way is effective and durable.

This patent is controlled by the Pennsylvania Machine Co., Limited, Philadelphia, Pa., of which the inventor, Mr. J. J. White, is President.

Berlin's Proposed Underground Electric Railroad System.

The attention now given to underground electric railroad systems lends special interest to a report on the proposed system for Germany's capital by the Allgemeine Elektricitäts Gesellschaft, of Berlin. The city is to be traversed underground by two lines, crossing each other at right angles and following the main lines of traffic. The quadrants thus formed are to be put in communication with one another by two concentric underground belt lines, and the four lines together, it is thought, will afford ready communication between all parts of the city. Stations are to be placed at all crossings and at a number of other desirable points. Separate tunnels are to be driven for the different lines of track, and the several sections are to be entirely independent of one another, crossings being effected at different grades. There are to be no switches; loops are to be provided at the terminals, so that the system will be practically endless. All danger of collision, it is thought, will thus be avoided.

The tunnels are to be of mild steel tubes, of oval cross-section, with walls about $\frac{1}{2}$ -in. thick, and the two axes measuring about $11\frac{1}{2}$ and 9.8 ft. They are to be at depths below the surface of from 26 to 50 ft., so that the bed of the river Spree will be crossed at a depth of at least $7\frac{1}{2}$ ft. The tunnel tubes will be built up of flanged plates, bolted together. The spaces outside the tubes or tunnel linings will be filled with cement mortar, and a coating of the latter will be applied also to the inside. Nothing is said of the system of tunneling to be employed, though it may be inferred that shields will be used in the manner which has now become familiar.

The electric propulsion system to be used will, in the main, be that installed by the Allgemeine Elektricitäts Gesellschaft at Halle, Germany. The cars are to be run not singly, but in trains of three. The cars are to have two pairs of axles each, and are to be built with centre aisles, and seating capacities for 40 passengers. Independent electric locomotives are to be used for the trains, the current being supplied from central stations. The trains are to be run at intervals of three minutes, and at speed of about 25 kilometers (about 15½ miles) per hour. At this speed, it is thought, the trains themselves will accomplish all that will be necessary in the way of ventilation, though the possible use of electrically-driven ventilating fans is mentioned.

The stations will be between the parallel tunnels, and will also be constructed on the tube system. Several tubes will be laid side by side, and the intervening walls will be replaced by massive columns. Elevators are to be used to carry passengers to and from the stations from the street surface, and each elevator is to have a capacity of from 40 to 50 passengers. Besides the elevators, however, there are to be stairways.

It is of interest, in connection with this, to note that the city of Vienna also is contemplating building an underground system on the same lines, essentially, as those mapped out for Berlin.

Narrow Gauge Railroads in Europe.

Mr. Alfred Birk reviews, in the *Journal of the German Railroad Union*, the present position in Europe of narrow gauge railroads, on the adoption of which depends (he says) any further considerable extension of railroads in civilized countries. In Germany, he says, the narrow gauge has received very different treatment in the different countries. Saxony was early in the field with 75 centimetre ($29\frac{1}{2}$ -in.) lines, and has continued to build them; Prussia has only begun to pay attention to the narrow gauge; Bavaria will have nothing to do with it; in the smaller German states it has fared better, especially in Hesse. At the close of 1890 the whole German Empire had 542 miles of narrow gauge railroad, with 618 miles of track and 352 stations—on the average little more than a mile and a half apart.

In Austria, though it early built the narrow gauge military line in Bosnia, the narrow gauge gained ground slowly, but it receives more attention now, especially in Styria, where a local line will soon be opened. Austria (not including Hungary and Bosnia) has about 60 miles of narrow gauge railroad.

In Belgium a corporation called the National Local Railroad Co., which builds many short lines, constructs metre gauge lines chiefly, and 3 ft. 6 in. lines where they connect with Dutch local roads of that gauge. There are 594 miles of narrow gauge railroad in Belgium.

Holland has had steam tramways for many years, and at the beginning of 1890, 304 miles of these were of narrow gauge— $20\frac{1}{2}$ in., 3 ft. 3 in. and 3 ft. 6 in.—and not quite so much of standard gauge. One of the cheapest of these lines, of $20\frac{1}{2}$ in. gauge, cost \$10,044 per mile, equipped.

France of late years has built a great many narrow gauge lines; in 1890 the Government issued regulations for the construction of lines of 1 metre and of 75 centimetres gauge, but nearly all lines built are of the former. The Decauville lines of 60 centimetres gauge at the last Paris Exhibition attracted great attention, and there is talk of employing it for local lines. At the end of 1890 France had 1,848 miles of the local lines termed "secondary railroad," and of these 843 miles were narrow gauge lines.

In Switzerland nearly all the mountain railroads built of late years have narrow gauge. In Italy, Portugal and Spain, Mr. Birk says that the narrow gauge has not made much progress; but there are at least three narrow gauge steam tramways in Italy. In England the Festiniog Railway has had no imitators, and in Ireland, where 23 miles of narrow gauge road were built, any further extension of them is opposed.

Norway has built little else than narrow gauge railroads since 1862, and has now about 620 miles of them, against 372 of standard gauge; and about 930 of the 4,600 miles of railroad in Sweden are narrow; the gauges vary from $31\frac{1}{2}$ in. to $47\frac{1}{2}$ in. Some of these, especially the early ones, have been very profitable, but others were built for speculation, and several do not pay. Denmark, which is a flat country, opened its first narrow gauge railroad last summer. It connects a fishing village with a fish market, and was built chiefly to carry fish; is very nearly straight and level, and cost \$8,520 per mile.

Greece, which until 1883 had but one railroad, the 6-mile, standard gauge road from Athens to its port, Piraeus, has since then built a considerable system, all of metre gauge. At the close of 1890, 372 miles of this system were completed and 204 miles under construction. The most productive line yielded \$5,230 gross and \$3,046 net in 1888, but no other more than \$3,022 gross and \$1,100 net. A line from Athens north to connect with the European system through Turkey and Servia is being built with the standard gauge.

The Mason Air Train Signal.

The Mason Air Signal Co., of Chicago, has brought out a pneumatic train signal for freight or passenger service which has some new features. The system consists of a $\frac{1}{2}$ -in.-pipe running the whole length of the train, coupled in the usual manner and with discharge, signal, and reducing valves, also a small reservoir from which the whistle is blown. The discharge valve is of a rotary type, and when opened admits air from the signal pipe to the small reservoir at its side. This reservoir is only large enough to produce the necessary reduction in pressure and holds the air until the handle of the valve is returned to its normal position, when communication to the signal pipe is shut off and the air in the reservoir is exhausted into the atmosphere. For a train of ordinary length a discharge valve with a reservoir of about one pint capacity is found to be large enough, but cabooses are fitted with a second one of about double the size for trains of 40 or 50 cars.

The signal valve is of the usual form, but has, in place of the usual diaphragm, a light piston which rises with a reduction of train pipe pressure, and opens a passage between the small reservoir and the pipe leading to the whistle, which blows until the pressure in signal pipe and reservoir is equalized. There is no variation in the length of the blast for given train, except in case of a bad leak or breaking in two of the train.

The reducing valve is placed within reach of the engineer, and beside it is a gauge which shows the pressure in the signal pipe, which is kept at about 60 lbs. Ordinarily the air feeds slowly through the valve from the main reservoir as needed, but in case of a considerable reduction in pressure a single movement of the valve handle to an emergency position will quickly recharge signal pipe and reservoir. One large Western road has ordered this signal for one train, for trial.

Recent Progress in Car Construction and Design.*

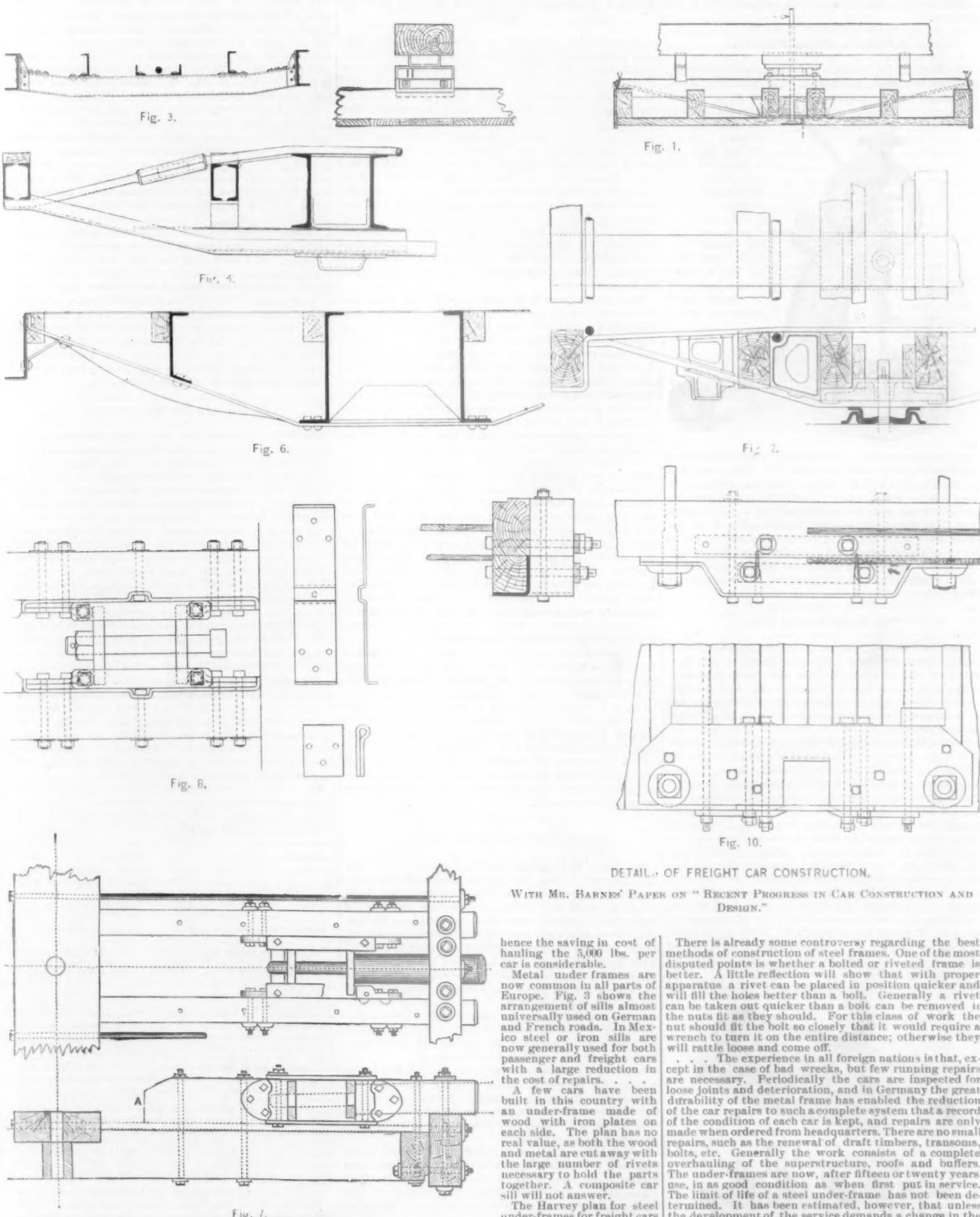
Within the limits only a short review can be given of the more recent progress in freight car construction; therefore, what follows is a collection of notes on the more important matters, much condensed.

The freight car in use twenty years ago was in appearance not unlike those we now use; but the difference in construction is considerable. The most important change has been in the increase of capacity. The old cars were adapted to carry 24,000 lbs., and weighed 20,000 lbs., or 0.87 lbs. of dead weight per pound of rated useful load. The present car weighs about 30,000 lbs., and has a capacity of 60,000 lbs., or 0.5 lb. of dead weight per pound of rated useful load. The car of twenty years ago had a capacity of 1,000 cu. ft., or about 20 lbs. of dead weight per cubic foot, or a rated capacity of 24 lbs. per cubic foot. The recent cars have a capacity of nearly 2,000 cu. ft., or 15 lbs. of dead weight per cubic foot and a rated capacity of about 30 lbs. per cubic foot. There has been 37 per cent. decrease in dead weight of box freight cars per ton of full rated load; 25 per cent. decrease in dead weight per cubic foot of capacity, and 25 per cent. increase in the full rated load per cubic foot of capacity.

The changes in the details are somewhat as follows: Fig. 1 shows the arrangement and size of sills formerly used, and fig. 2 that which is now acceptable. The comparative dimensions of sills are 4×7 in. and 5×9 in. The increase in the amount of material in the sills and the use of iron in the body bolsters has come from the increase in severity of service. Probably nothing illustrates this so well as an examination of the sills and drawbar attachments which have been taken out of light cars in the last five years. The wood removed is the best that the market affords; it is generally good seasoned oak with little or no decay. The repairs have consisted in replacing good material which is broken by good material which is not broken.

An ideal car would be one that breaks or needs repairs only as the material decays or is worn out except in the case of wrecks. Train wrecks are not the cause of the majority of repairs to underframes of freight cars. The severity of ordinary service is the main cause, and this will not be less in the future. Locomotives are being made heavier and trains longer and more cumbersome to

* Paper by Mr. D. L. Barnes, *Railroad Gazette*, before the Western Railway Club.



DETAILS OF FREIGHT CAR CONSTRUCTION.

WITH MR. BARNES' PAPER ON "RECENT PROGRESS IN CAR CONSTRUCTION AND DESIGN."

hence the saving in cost of hauling the 5,000 lbs. per car is considerable.

Metal under frames are now common in all parts of Europe. Fig. 3 shows the arrangement of sills almost universally used on German and French roads. In Mexico steel or iron sills are now generally used for both passenger and freight cars with a large reduction in the cost of cars.

A few cars have been built in this country with an under-frame made of wood with iron plates on each side. The plan has no real value, as both the wood and metal are cut away with the large number of rivets necessary to hold the parts together. A composite car sill will not answer.

The Harvey plan for steel under-frames for freight cars is probably the best that has been used here. It consists of double channels for intermediate and side sills and a single large channel for center sills, as shown in fig. 4. Several rolling mills are devoting their attention to the development of metal cars, hoping thus to find a large market for channels and rolled shapes. Four car companies and several railroads have made designs of metal cars and estimates of the cost of manufacture. The most interesting of them all is, I think, shown in fig. 5, prepared from drawings by Mr. R. P. Lamont. [The cut showing this has not been received. The description is held for another issue.—EDITOR.]

One fact that makes this subject an interesting one at the present time is the great reduction in the price charged for rolled steel beams for car construction. Formerly the price was 3½ cents per pound, or \$70 per ton. It is now less than 2 cents per pound, or less than \$40 per ton; so that now a car can be constructed with a metal under-frame for about \$10 additional cost and about 5,000 lbs. saving in total weight.

There is already some controversy regarding the best methods of construction of steel frames. One of the most disputed points is whether a bolted or riveted frame is better. A little reflection will show that with proper apparatus a rivet can be placed in position quicker and will fill the holes better than a bolt. Generally a rivet can be taken out quicker than a bolt can be removed if the nuts fit as they should. For this class of work the nut should fit the bolt so closely that it would require a wrench to turn it on the entire distance; otherwise they will rattle loose and come off.

The experience in all foreign nations is that, except in the case of bad wrecks, but few running repairs are necessary. Periodically the cars are inspected for loose joints and deterioration, and in Germany the great durability of the metal frame has enabled the reduction of the car repairs to such a complete system that a record of the condition of each car is kept, and repairs are only made when ordered from headquarters. There are no small repairs, such as the renewal of draft timbers, transoms, bolts, etc. Generally the work consists of a complete overhauling of the superstructure, roofs and buffers. The under-frames are now, after fifteen or twenty years use, in as good condition as when first put in service. The limit of life of a steel under-frame has not been determined. It has been estimated, however, that unless the development of the service demands a change in the design of cars the life will be from fifty to eighty years. This could not be true of stock and refrigerator cars, unless some means were provided for keeping the moisture away from the tops of the sills.

The introduction of steel for car framing here has been hindered by the enthusiasm of those who have proposed it. Generally they have advocated a too radical change, such as the construction of steel floors, linings and sidings. The time has not come for these, and it is doubtful if the American method of railroad operation will ever permit the use of a steel floor. A wooden floor is necessary, in order that cleats and braces may be nailed theron to keep merchandise from shifting in transit. A metal superstructure, floor, siding and lining will not be generally used until long after metal sills are common.

One of the most radical improvements in the general construction of freight cars and a long step toward the introduction of a better under-frame made of steel, is shown [cut not received.—EDITOR.] where it will be seen that the draft sills have been removed and the floor of the car dropped so that the centre still

handle, and it is not to be expected that the engineers running locomotives will be more careful than they have been. On the contrary, the introduction of air brakes and automatic couplers will make engineers even more reckless. They will know that the trainmen are not between the cars at the time of coupling, and they will, perhaps, therefore be less careful about the speed at which couplings are made. The speed at which couplings are made is the one feature of service which most affects the life of car under-frames.

Wooden under frames have been increased until the limit is reached. They are now as heavy as it is economical to make them. Formerly they were made about 4 x 7 in. They are now 5 x 9 in. The weight of wood has been so much increased that a steel under-frame having more than twice the strength of the best wooden frame can be made that will weigh only about one-half as much, and the saving in the total weight of the car is about 16 per cent., or 5,000 lbs. This means one average loaded car in every ten or twelve cars in a train;

occupies the position formerly occupied by the draft sills. The advantages are as follows: The centre line of draft is above the bottom of the sill. With the same height over all the car has nearly 8 ins. increased clear height inside. By this construction a full load of oats and furniture and other light freight can be carried without exceeding the reasonable height of cars. If steel sills were to be substituted for the wood centre sills only in this design, the result would be a decidedly stronger and more durable under-frame and a continuous steel draft rigging. There would be no wood on the line of draft throughout the train.

Body Bolsters.—Probably the advance in construction of the body bolsters is as marked as that of any other detail of freight cars. Formerly they were made of a single piece of timber, as shown in fig. 1. Such bolsters served admirably at the time they were made, but they soon became inadequate to withstand the shocks of service, and naturally enough an iron bolster was used. The latest and best form is that used by the Chicago, Burlington & Quincy Railroad. See fig. 2. The ends of the top member of the body bolster are bent down to carry the side sills, as shown. This is probably the strongest form of body bolster now used. It is not unlike one that has been proposed for the metal under-frames shown in fig. 6; but for metal framing it is much better to use a wider bolster than 8 or 9 in. The one shown in fig. 6 is 15 in. wide and has a corrugation in the centre of its width to stiffen it.

locomotives and heavier cars. The modern draft rigging is as strong as it ever need be made for wooden sills. When a rupture occurs now it is the sill that cracks and splinters, and not the draft rigging that breaks.

Formerly the draft sills were strong enough when secured to the longitudinal sill only by vertical bolts. See fig. 7. Keys between the two were later substituted to assist the bolts. When the strains became too heavy for both the keys and bolts, then the sills were extended back to the transoms. See fig. 8. Soon this was insufficient, and the transoms were displaced by the blows that the car received, and a sub-sill, now commonly used, was introduced between the transoms to prevent their displacement, thus making what is, in fact, nothing more than a double centre sill throughout the car from end to end, one sill lying under the other. This is the present construction.

Another defect was found in the old form resulting from the location of the centre line of draft below the sill. The blow taken by the drawbar being below the sill, as shown in fig. 9, tended to double the cars up by bulging up the centre, particularly in the case of flats. The use of a sub-sill, before referred to, prevents this. The equivalent of this is found in the latest form of the C. B. & Q. 60,000-pound cars, which is now the standard of that road. This design is shown in figs. 2, 8 and 10, which illustrate how the drawbar is passed through the end sill and is located so that the line of draft and

Facilities for the Interchange of Traffic Under the Interstate Commerce Act.

BY LAWRENCE GODKIN.

It is proposed in this article to examine, in the light afforded by the decisions of our Commission and Courts and of the English Railway Commissioners, the duties and obligations imposed by the Interstate Commerce Act on common carrier corporations in their relations with each other, in respect to the interchange of traffic. The third section of the Act reads as follows:

Sec. 3. That it shall be unlawful for any common carrier subject to the provisions of this Act to make or give any undue or unreasonable preference or advantage to any particular person, company, firm, corporation, or locality, or any particular description of traffic, in any respect whatsoever, or to subject any particular person, company, firm, corporation, or locality, or any particular description of traffic, to any undue or unreasonable prejudice or disadvantage in any respect whatsoever.

Every common carrier subject to the provisions of this act shall, according to their respective powers, afford all reasonable, proper, and equal facilities for the interchange of traffic between their respective lines, and for the receiving, forwarding, and delivering of passengers and property to and from their several lines, and those connecting therewith, and shall not discriminate in their rates and charges between such connecting lines, but this shall not be construed as requiring any such common carrier to give the use of its tracks or terminal facilities to another carrier engaged in like business.

It will be observed that the second paragraph of this section is the one which relates in express terms to facilities for the interchange of traffic. But the matter may also be considered as covered by the language of the first paragraph, for the giving or withholding of such facilities would constitute a case of undue or unreasonable preference or advantage, prejudice or disadvantage. In other words, the second paragraph of the section specifically and positively applies to interchange of traffic by common carriers, the general prohibitory injunction contained in the first paragraph. For the word "facilities" in the second paragraph of the section, has been construed as including in its definition rates and charges for transportation.¹ And since this construction has been given to the word, it is apparent that the positive duty of affording "equal facilities" for the interchange of traffic, includes by implication a prohibition, in respect to interchange of traffic, against the matters prohibited in the

first paragraph of this section, to wit, making or giving or subjecting to any undue or unreasonable preference or advantage, prejudice or disadvantage or discriminating in rates and charges between connecting lines.

In its ultimate analysis therefor, and stripped of repetitious verbiage it will be found that the third section of the Act imposes two duties upon common carriers in their dealings with each other in respect to interchange of traffic namely:

- To afford reasonable and proper facilities for interchange of traffic.
- To afford equal facilities for the interchange of traffic.

The requirement of equal facilities is nothing more than a statutory declaration of the common law on the subject. The courts already held before the passage of the act that carriers must give equal service on equal terms to all common carriers who applied to them.²

The second paragraph of the third section of the Act is modeled in part upon the English statute, and in part upon the American State statutes in existence at the time the Interstate Commerce Act was passed. Its purpose, as stated by Senator Cullom in Congress was "to require railroads to furnish connecting roads all reasonable and proper facilities for the interchange of traffic that may be necessary for the convenience of the public, and to prevent one road or combination of roads from 'freezing out' a connecting line by refusing to accept traffic from it, or deliver traffic to it, upon any terms, as has been done."³

The English statutes from which much of the language of our Act has been copied are the English Railway and Canal Traffic Act of 1864 (17 and 18 Vict., Chap. 31) and the Regulation of Railroads Act of 1873 (36 and 37 Vict., Chap. 48). Some provisions of the American Act will be found upon examination to have been copied almost literally from the English Acts, and for this reason some of the decisions of the English courts and Railway Commissioners have become of peculiar importance under the well known canon of statutory construction that where British statutes have been adopted into our own legislation, the interpretation of those statutes by British courts will be considered as silently incorporated into

(Continued on page 85.)

¹New York & Northern R. R. Co. vs. N. Y. & N. E. R. R. 4 I. C. C. R. 702.

²Denver & New Orleans R. Co. vs. Atchinson, T. & S. F. R. Co., 15 Fed. Rep., p. 650.

³Painter's Interstate Commerce Debates.

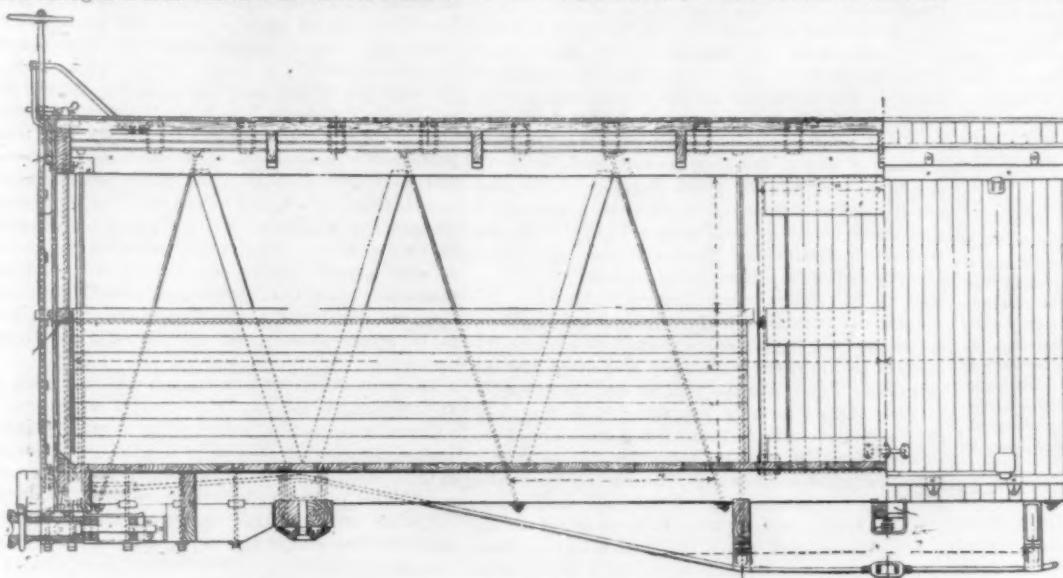


Fig. 9.

The plate of which it is made is but $\frac{1}{8}$ in. thick. Its weight is about the same as a 9-in. bolster of the ordinary form. The introduction of metal under-frames will necessarily change considerably the detailed construction of the bolsters, as a wide bolster is of great assistance in keeping an under-frame square. Always in riveted work the thinner the sheets the better the rivets will hold, and a wide thin bolster is more secure than a narrow thick one; it has more rivets, and the rivets can be made to better fill the holes.

Draft Rigging.—The most expensive detail in point of repair is the draft rigging. The old form with cast iron stops secured to the wooden sill by means of bolts is shown in fig. 7. This construction is practically worthless now. It will not stand ordinary service without fracture. When it breaks the result is almost invariably broken or splintered sills. Since the time this was generally used there have been many changes. Probably the first was the use of projections cast on these stops, which were inserted in recesses formed in the sides of the sills. Then both stops were cast in one piece of cast iron. Cast iron was found to be inadequate, and malleable iron, wrought iron, pressed steel, and cast steel are now generally used instead. In general all latter forms of drawbar stops are made in what is equivalent to one piece, and have a wide bearing on the sills. In this way there is more than double the security of attachments between the stops and the sills, and more than double the resistance to the blows and shocks on the drawbar. All are familiar with the different forms of drawbar stops that are for sale as they are generally shown in the advertising columns of the technical papers. Nearly all of them are good, and every one of them is an improvement over the old form.

There is one type of drawbar stop which has not been illustrated, but which is admirable for its simplicity and low cost. It embodies all the fundamental principles of the latest forms of this detail of car construction, and has been in use long enough to prove its merits. It is shown in fig. 8. A comparison of this with the other and older form shows the progress made in drawbar attachments. It is composed essentially of two parts, a face plate which protects the centre sills, or draft sills, as the case may be, and secures the two end stops together. This piece has a projection which is recessed into the face of the sill. There are the usual top and bottom binders which hold the draft springs in position, but these have in this device no office in adding to the strength of the construction as they do in a design such as fig. 7 of the old type. The bolts which pass through the face plate and the stops together with the lip on the ends of the face plate serve to hold both stops together and distribute the buffing strains over all of the bolts, and make it thus equivalent of one integral attachment. The parts of this are all made in the ordinary bulldozer or bending machine.

To show the comparative value of the new and the old, it is only necessary to state that the modern draft gear never breaks; it bends, and the resistance to rupture when attached to a wooden sill is more than 150,000 pounds, while the old type has less than 80,000. The increase in strength is nearly 100 per cent., and a natural inference would be that by the use of such devices the decrease in the cost of repairs would be under the same conditions about 50 per cent.

But although the modern draft rigging is much stronger than the older form, the repairs are not less than they formerly were, and this is because of the increase of the shocks of service due to use of heavier

shock lies above the bottom of the sills, and in such position as to give the cars a maximum resistance as to shock. The method of supporting the drawbar and strengthening the end sills to permit this construction is clearly shown.

With regard to the resistance of the draft rigging to shocks, something must be said about the additional provision for resisting heavy blows that is now made. Formerly the draft rigging itself received the entire shock. Two loaded cars moving together with a speed of one and a half miles per hour will close up the draft springs on both cars, and all blows greater than this must be resisted by the draft rigging itself unless some further provision is made. It has now become general practice to cast a flange on the top side of couplers which strikes against a wooden block bolted to the end sills whenever the shocks are sufficient to close the draught spring. Probably this flange comes against the end sill nine times out of ten when cars are coupled together. It is this flange which must in the future, as it does now, receive and care for almost the entire shock incident to coupling cars. Without it, the best draught rigging that can be made and attached to wooden sills cannot be made to stand. Hence, we may conclude that the draught gear should be made to withstand the pulling strains and the flange on the drawhead to resist the buffing blows.

It follows as a matter of course that the draw bar stop or flange should come against the end sill before the draft springs are closed up; but this important feature has been overlooked, and unfortunately the full advantages of the flange on the drawhead as a protection to the draft rigging have not been realized. The springs close up solid on new cars when the flange is against the end sills, with the result that when the end sills are driven in slightly by the flange on the drawhead, the draw gear takes a large proportion of the buffing blows. It is logical, then, to reason that the distance between the flange on the draw and end sill when the draft spring is uncompressed should be about three-fourths of an inch less than the movement of the spring. This would allow an indentation of end sills as much as three-fourths of an inch before the draft rigging would receive any severe shocks.

Some unscrupulous car builders allow the flange of the drawhead to come against the wooden stops without the interposition of any protection plate. We have all seen these cars after a little service. The wooden stop is pounded away from one to two inches deep, and on such cars the draft rigging will always be found to be out of order and driven back out of proper position. It is needless to add that a draft rigging cannot be made to stand under such conditions.

Some attempts have been made to reduce the effect of shocks by increasing the capacity of the draft springs, and the absorption of the shocks by friction and compressed air buffers. This step, while good for other reasons, is wholly inadequate to serve the purpose intended. It gives in general better results in pulling trains by reason of the increased spring slack, but has no advantage to resist the heavy shocks. It is impossible to use a spring with a capacity that will make it equivalent in absorbing shocks to the wooden sills when struck by the flange on the draw head. Again, such a heavy spring as would be required to be of material value in absorbing shocks would have a recoil after being struck which would be disastrous not only to the cars themselves, but to their contents. A wooden buffer has practically no recoil.

(TO BE CONTINUED.)



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS OF railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in his journal for pay, EXCEPT IN THE ADVERTISING COLUMN. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The acquisition of the Poughkeepsie bridge and its connecting railroads by the Philadelphia & Reading, which seems to be assured, will doubtless be a good thing for the bridge route and probably profitable, in the long run, to the Reading, though no one can predict any immediate change of importance. The Reading does well to secure an all-rail line to New England, and the shipment of coal from the mines to its final destination by rail is likely to become more profitable and more general rather than less so; but it remains true that the Central New England & Western, even with the Boston & Maine and other friendly lines added, as yet reaches only a very small percentage of the manufacturing centres of New England, and that coal can be carried from Perth Amboy to Boston by water and thence inland a long distance by rail at rates below the cost from the mines direct, over a hilly and circuitous railroad.

The automatic electric signals on the Providence & Worcester division of the New York, Providence & Boston Railroad do not cover the entire road; numerous spaces between stations have no signals whatever, and trains running through these spaces are not protected by any electric signal, or any fixed signal of any kind. This was clear enough from the statements of the *Railroad Gazette* of Jan. 8 and 22, and of Chief Engineer Dawley, as printed in *Engineering News*. But that paper on Jan. 23 came out with another statement, in which the contradictory character of the assertions made was more glaring than ever. A map was printed, made on the principle shown in the sketch herewith, showing the 44 miles of road under discussion, and under it were the words, "The solid black indicates parts of line protected by automatic electric block signals." These words corresponded with Mr. Dawley's accompanying statement. But the editor goes on to say that the other parts are "protected in about the same way;" that the track circuit is chiefly to detect broken rails, misplaced switches, etc., and that trains are protected from each other as perfectly on the open sections as on the black, "since the signals are connected together electrically as a continuous series." This connection would, of course, have to be by wire on poles or in a cable. In the editorial column we are conditionally pardoned for our error in trying to "block the progress of a needed reform." But as our contemporary's readers have a right to know the unclouded truth, we troubled Mr. Dawley with one more inquiry, and present the result herewith. The electro-type of the illustration will be freely lent to our temporary on application.

[From the Editor of the *Railroad Gazette* to Mr. Dawley.]

I have just read your letter in *Engineering News* of Jan. 23, accompanied by a map showing the portions of

your track protected by automatic electric block signals in heavy black sections. As the statements printed below the map conflict with what you say on the subject, I beg to ask that you will state specifically whether each train, as it enters one of the white sections, is protected, by the automatic action of the signal, against a following train. And is this protection afforded by "the signals being connected together electrically as a continuous series"? None of the previous statements, either of Mr. Chamberlain or yourself or of any journal, have made mention of this fact.

Moreover, that the matter may be perfectly clear, I beg to ask your attention to the enclosed diagram, in which I have sketched a portion of the road, showing the sections covered by track circuits in heavy lines. Referring now to the sketch, what sort of a signal exists at B, and how is it operated by a train proceeding from B toward C? And if a train running between B and C is protected by a signal, located either at B or A, how does

South Worcester.

Millbury.



the train return the signal to the all-clear position after it reaches C?

The sketch was returned with the following notation made upon it by Mr. Dawley: "No signal at B. Train running from B to C is not protected by any block signal." The statements in the accompanying letter tell nothing new. It only remains to add that the map in *Engineering News* shows ten such spaces as that between B and C besides some very short ones. To sum up in a word: The Chief Engineer of the road and the *Railroad Gazette* said that there was not a continuous block system between Valley Falls and Worcester; *Engineering News* said there was. And now our end of the schooner is at anchor.

For many years an able committee of the American Society of Civil Engineers has worked to advance the cause of reform in the methods of reckoning and noting time. From year to year we have recorded the progress of the reform as appearing in the reports of the Committee. The last report is a summary of the Committee's work from the beginning and we print it nearly in full on another page, for its historical value and its concise presentation of the present situation. The system of reckoning time from standard meridians an hour apart was a practical reform of great utility. That was introduced in the United States principally by the action of the railroads, on the suggestion of this Committee. The progress made elsewhere in the introduction of the same system is outlined in the report. The Committee has from year to year called the attention of the Society to the advantages of the 24-hour system of notation and that has for some years been the official system of the Society. But it has not made any progress in popular use and has made little in railroad time tables. It is used on a large part of the Canadian Pacific system, on the railroads of India and to a very limited extent elsewhere. At the recent annual meeting of the American Society of Civil Engineers a resolution was adopted authorizing the Committee to take steps to invite the railroads of the United States, Canada and Mexico to adopt the 24-hour system on the 12th of next October. This is thought to be a peculiarly appropriate date as the 24-hour notation is essentially Italian in its origin and it would be a compliment to the native land of Columbus to adopt it here on the 400th anniversary of his discovery of America. Probably the attention of the railroad officers will be called to this matter through one of the standing committees of the American Railway Association which promised last October to get an expression of opinion to be submitted at the April meeting of the association. This we trust will be done. While the 24-hour notation is not of nearly as much practical importance as the standard meridian system of reckoning time it is a decided convenience. It has long had the approval of a large percentage of the higher railroad officers of the country. Now all that remains is for them to make a concerted movement to bring it into use.

The demurrage reform, which has resulted in such marked benefits at numerous large cities during the last three years, found a specially inviting field at Minneapolis, where there is such a large single interest that handles bulk freight; and the experience of the roads in that region is told on another page of this issue. Although the general results are not different from those accomplished at other places, the work done deserves to be recorded, and various details in our account will be of special interest to all officers interested in demurrage. The salient fact is the *change in the rate*, which was made when the demand for cars began to grow urgent. Indeed this is, in our opinion, a vital principle if the demurrage system is to be a permanently valuable feature of railroad operation. The past success of demurrage associations, good as it has been, has been achieved only in spots, so to speak, and there is yet much more land to conquer; but to

consistently cover the whole field the far-reaching laws of supply and demand must be fully recognized. When cars are standing everywhere idle, demurrage charges are legitimate only as a means of facilitating work and economizing yard room, and they cannot be heavy. When cars are worth \$10 or more a day, the demurrage charge should be as high as a due regard for the rights of the consignee will allow. Means should be taken to make this variation in rate, as often as necessary, without undue friction. To the fact that it *has been* made, informally, in great many cases, is doubtless due a considerable measure of the success hitherto attained.

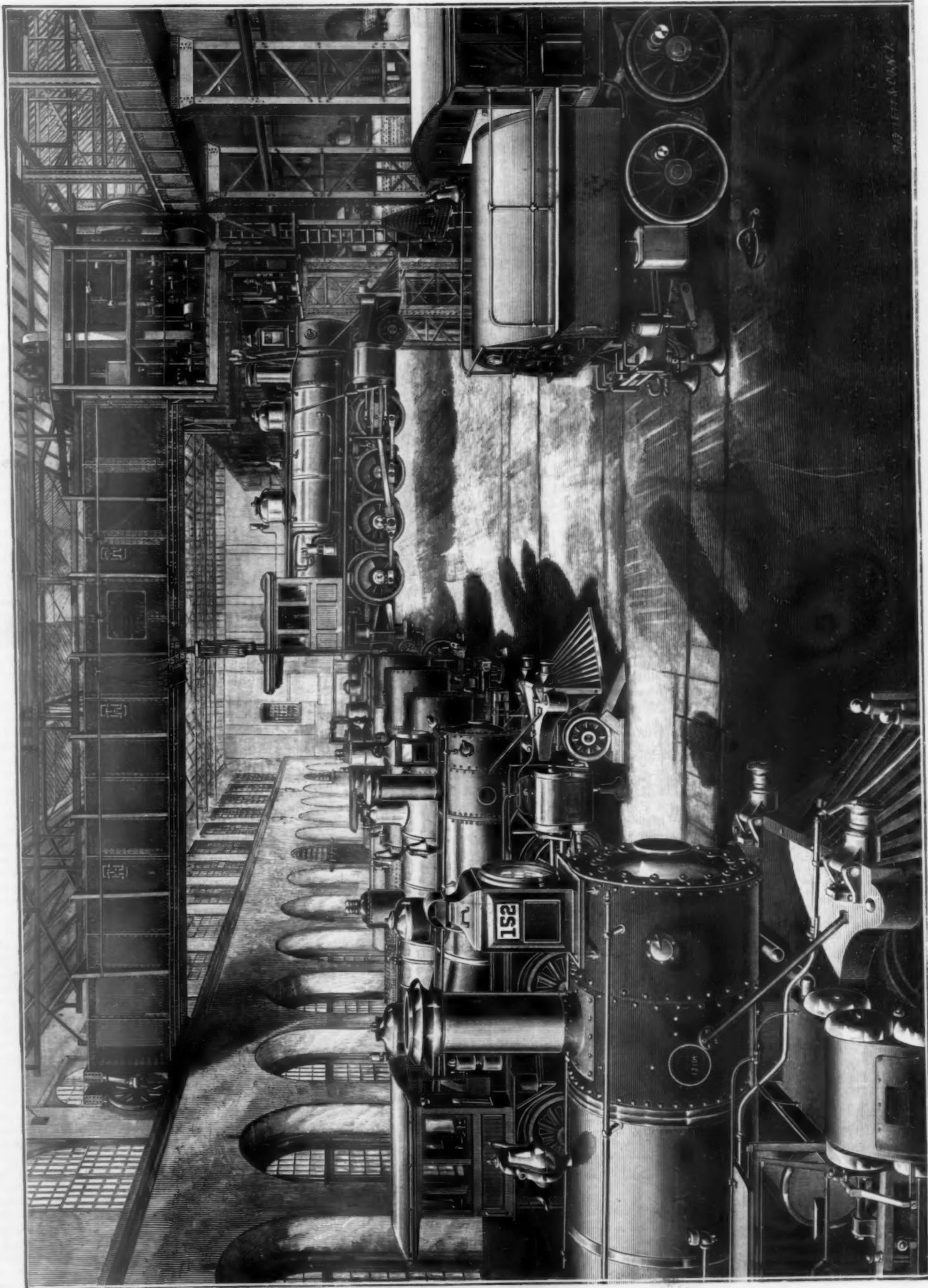
Car Service Settlements.

We ask especial attention to the report in another column of the recent meeting of the American Railway Association's Committee on Car Service. The plan of settlement of car service balances that appears to have been agreed upon is half a cent a mile and six cents a day, and it was decided to take steps to have this plan adopted by as many companies as possible at the beginning of the next fiscal year, July 1, 1892. We say *appears* to have been agreed upon, for the exact form of the committee's report has not yet been made public. We have good reason to believe, however, that this will be the basis of settlement recommended, and that immediate steps will be taken to get enough adherents to the plan to warrant putting it into force next July. All but two of the Committee were present, as were a number of the members of the Per Diem Committee of the Car Accountants' Association, therefore we may take the action of the conference as fairly representative; and if it is so, it is fairly encouraging.

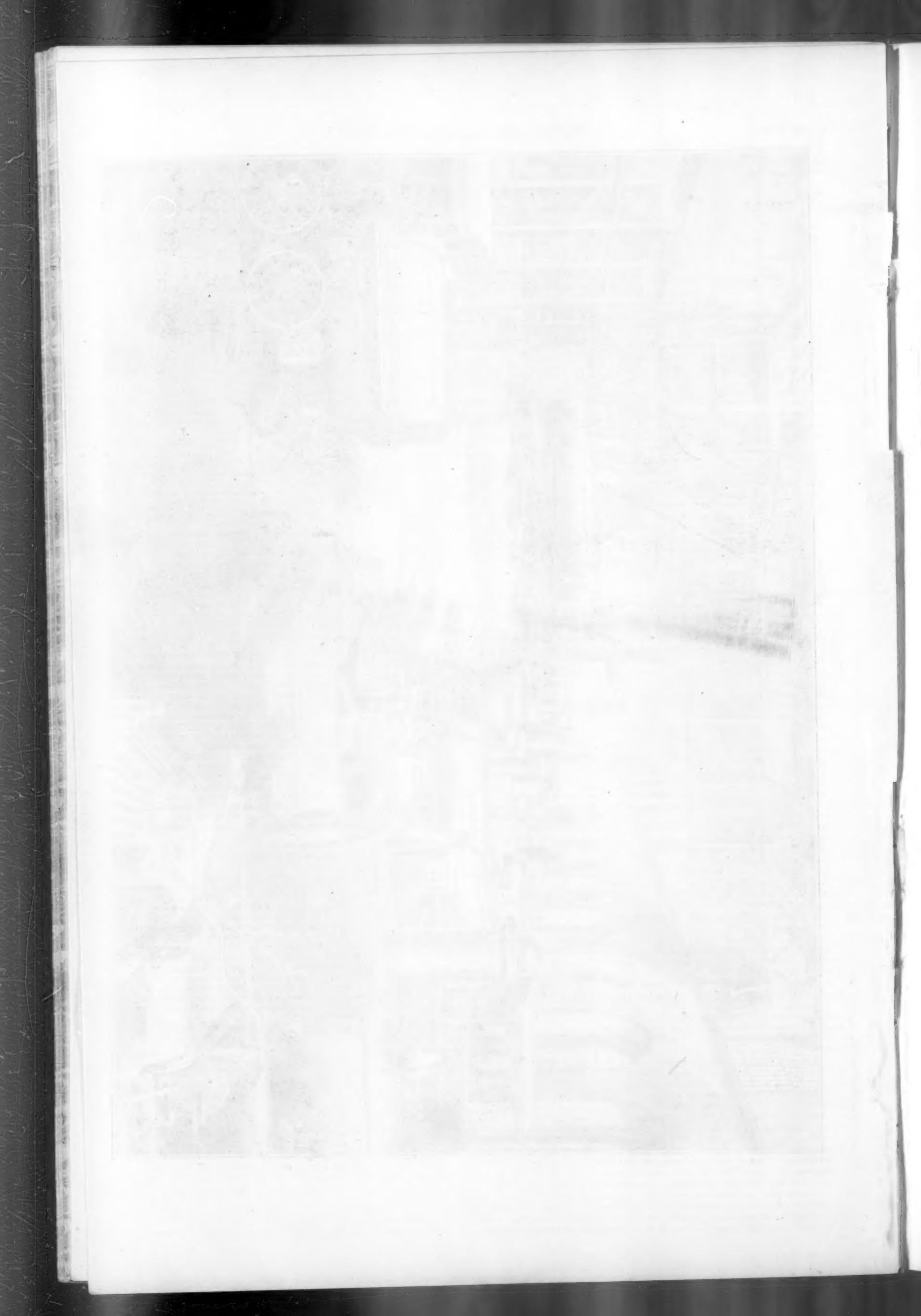
The propositions are as reasonable and moderate as anyone ought to ask for. The basis of settlement is adjusted so as not to increase the average balance against borrowers if they keep foreign cars moving at the average rate of 24 miles a day; and it is proposed to ask the railroads to try it for only 12 months.

It is too late in the century to say much about the enormous importance of getting more service out of freight equipment; or about the difficulties of making a reform. Those matters have been thrashed over very thoroughly in the last 10 or 12 years. The extent of the use and abuse of borrowed cars is common knowledge; and it has been estimated that the permanent investment in cars that would not be needed if their mileage were doubled, and in side tracks to hold idle cars, and motive power to handle surplus stock, amounts to at least \$290,000,000. The loss of interest and the waste in depreciation and repairs make up a tremendous item of possible economy. This great investment is not without some advantages, of course. Cars make handy storehouses for your customers' goods, especially if they belong to someone else and if you do not have to pay any rent for them. But, unfortunately, while you are pirating A's cars C is pirating yours, so in the end you gain nothing, but on the contrary have to contribute your part toward about the most expensive system of warehousing that could be invented. The difference in cost of storage per cubic unit, in cars and in warehouses, taking into account the ground occupied and the cost of the foundations (the track in the case of cars), is in the aggregate a colossal figure: yet, so long as the railroads allow their cars to be used for storehouses they must lose this difference: the public does not pay it, even indirectly. It is not at all certain, in fact, that stealing your neighbor's cars and sending them into the wheat fields to wait there a month or two till the wheat is threshed is the cheapest way of getting a share of that business. It is quite possible that country elevators would answer the same purpose and be cheaper.

The absolute waste from the present unscientific use of freight cars is variously estimated at from \$25,000,000 to \$50,000,000 a year. As we said above the railroads lose this and not the public. We do not say that all this could be saved, or even half of it, by "per diem" or by per diem backed up by the efficient and extremely useful work of the car service associations at terminals and junctions. We do not say that "straight per diem" or a mixed per diem and mileage basis of settlement is the ideal plan or will be permanent; but nothing else so good and so promising has ever been seriously proposed,—much less brought to the point of actual trial in practice. Therefore, those railroad officers who really want to administer the properties under their charge in a strictly business way and get a maximum product at a minimum cost will not have done their duty by those properties until they have given a thorough trial to the plan put forward by the American Railway Association's Committee. And this seems a particularly good time to



ONE-HUNDRED-TON CRANE, ELECTRICALLY OPERATED—BALDWIN LOCOMOTIVE WORKS.



try it. There is a certainty of abundant business and a probability of a scarcity of cars for a long time to come. The opportunities and the exigencies of the traffic department will, therefore, be less than usual, and the chances of good faith among the different railroads rather better than usual. It looks like an uncommonly good opportunity for the railroads of physical and moral backbone to make the experiment of using what cars they own instead of buying more to stand on some one else's side track.

Some of the Troubles of Operators.

The telegraph operator's letter printed in another column makes an appeal which is based on right principles, and is not without weight, though the argument is overdrawn in some respects. While we fully realize the shortcomings of the railroad companies in this matter, and heartily sympathize with our correspondent and those he represents, in their desire to better themselves, we can only touch upon a few of the principal points in the question he brings up, for to discuss it with any show of completeness would involve an inquiry into the entire field of the employment question. We cannot speak of the West Shore in particular (except to say that it is poor, and so is tempted to scrimp worse than some others) but must consider roads in general.

Operators are employed who are too young and inexperienced. Sufficient effort is not made to guard against the dangers due to their youth or to give them right and profitable experience. A marked instance of this was published by the New York Railroad Commissioners in its annual report for last year. The station agents' association has agitated this subject somewhat, especially in Ohio; and claims, not without a good deal of evidence, that poorly trained operators handle train orders in a great many offices. It is true also that railroad officers more carefully grade trainmen than they do operators. Superintendents and train masters who give gruff replies are still far more numerous than they ought to be, indicating that more care ought to be given to selecting men for such places; but we think managers are improving somewhat in this respect, and "Ajax" must bear in mind that a good deal of the money that he and his brethren want will have to go to these higher employés if the companies aim to get that rare sort of man who is kind and amiable while at the same time gifted with the energy necessary to run a railroad.

But as against these considerations most railroad officers have, in their minds, what they feel to be a pretty strong justification of their course, though it is not easy in every case to clearly state it. As to safety in transmitting messages, they try to get competent dispatchers and they believe that the duplicate order system, with proper regulations, enables a good dispatcher to handle trains safely even with a poor operator. This view is not wholly confirmed by experience, but it is sufficiently confirmed to lead superintendents to use their money, which might go to secure better operators, in other directions, where they believe there is still greater need of improving the service. The reason they do not have money for these purposes is, in some cases, lack of earnings; in others, the feeling of the directors that as long as their reputation for safe operating is no worse than that of the generality of roads, they are justified in taking the money as profits. The shortsightedness which takes this view instead of building up a perfect service (which will cost more money now but will be more profitable in the future) has often been reprehended in these columns.

Our correspondent should not lay too much stress on mere proficiency as an operator, important as that is, for the fault with operators is of a more general nature. Collisions occur by reason of forgetfulness; of errors of judgment which are chargeable not to the person who made them but to the officer who, being older, knew the danger and ought not to have made the appointment; and because of general moral inefficiency. These defects are not peculiar to telegraph operators. An operator needs the strength of character to keep awake under a sense of duty when he desires to sleep; to hold enginemen to the rules even if it involves "unpleasantness" with a disagreeable person. He needs the good judgment that will keep him from neglecting a train order even if a dozen saucy passengers are pestering him. These qualities of character are needed, however, in other places, as we have said. We agree with "Ajax" that railroads ought to pay more money and get more men of that kind. But even if they do it, grading is very difficult in station work. To pay a man more because he is more capable, but before the company has a higher place for him, is a thing we cannot expect until we have more

angels and fewer financiers among railroad owners. Promotions accompanied by a 25 per cent. increase (or even five per cent.) must be very rare, except in a new country. Promotion from one station to another is often a difficult matter to arrange, especially where a man has a family and the increase is small; while promotion from one train to another is generally very easy. Benevolent minded superintendents have tried to favor station men in this way, but with the limitations placed by the directors on the expenditures, they generally find it up-hill work.

But most of an operators' misfortunes are due to causes outside of all these. The telegraph was new only 45 years ago, and the era of high wages incident to a new industry has only fairly passed. The country was likewise new up to a few years ago; but now it has assumed the characteristics of an old one. There are two qualified applicants for one place where there were formerly two places for each good man. There is no help for this but to murder infants and immigrants. A hundred operators scattered over 500 miles cannot combine against an unreasonable employer as can the same number of enginemen all living in one place. This is also irremediable. Moreover, there is no use in an operator's shutting his eyes to the fact that a road can do a considerable business without operators while it can not do a stitch without enginemen. As long as railroads are run for profit it is futile to expect directors not to take advantage of this fact.

Fourteen hours a day, or even 12, seven days in a week, is too long working time in one line of indoor work; but as long as there are plenty of men willing to work 15 hours for the same pay the outlook for improvement is poor. But railroads must largely blame themselves for the tendency to restrictive legislation, as long as their employés, thus worked, have constantly before them the spectacle of other employés, banded in unions, getting equal or better pay for 10 hours a day, six days in a week. It is only to be expected that the overworked men will enlist the sympathy of legislators and of the public generally.

Train Accidents in 1891.

We print herewith the table giving our usual annual summary of train accidents as published in the *Railroad Gazette* monthly during the year, together with the statistics for the previous 18 years that these records have been kept. The totals of accidents and of the various kinds of accidents, as well as the total casualties, do not show sufficiently marked differences from those of former years to call for special comment. The number of persons killed per million train miles has been computed and added to our ten-year table. As we have heretofore explained, neither these figures nor the others relating to casualties are of great value for comparison with those issued by the Interstate Commerce Commission, even if the years for which they are gathered were the same, as the classification adopted by the Commission makes it impossible to compare "other accidents" and accidents to "other" persons. The total number of persons killed, in our table, includes a considerable number of tramps and "other persons," as will be seen by the five-year table of casualties; and the train mileage does not include switching and work trains. Nevertheless the averages will not be without interest.

The statement that the totals are not unusual is perhaps subject to modification as regards derailments caused by malicious obstructions and those caused by misplaced switches. It will be seen that the number of the former, 42, is more than 50 per cent. larger than in 1890, and more than twice as great as in any year before that. We have no accurate statistics on this point and can only judge by the general impression produced by reading the newspaper accounts in the course of the year, but this impression certainly goes to substantiate the accuracy of the figures; that is to say, there seems to have been a marked increase in 1891 over former years. The arrest and imprisonment of a crazy man who succeeded in derailing two or three trains, and the slaughter of 18 passengers at Statesville, N. C., in August, by a wreck which is currently attributed to malicious derailment, are marked incidents of the year. Several other train wrecks have been imprisoned.

The number of misplaced switches, 78, is 8 less than the average for the six years 1870-84, and is only 2 more than the average for the five years 1873-77. In view of the increase in railroad mileage and train mileage during these years this seems to be a marked improvement in the record. Increased safety may have been attained by better discipline, by the substitution of split for stub switches, or by the introduction of interlocked distant signals. Which cause preponderates would be hard to say. Doubtless there are circumstances within the experience of many superintendents tending to throw light on this question; we should be glad to hear from them.

The most serious train accidents of the year, arranged in the order of their importance, as reckoned by the number of persons killed, were the following: Ravenna

O., July 3, killed 21; Statesville, N. C., Aug. 27, killed 18; Hastings, N. Y., Dec. 27, killed 15; Montezuma, N. Y., Aug. 5, killed 14; Charleston, W. Va., July 4, killed 14; Aspen Junction, Colo., July 11, killed 9; Toledo, O., Nov. 28, killed 9; Kipton, O., April 18, killed 6; Fourth Avenue Tunnel, New York City, Feb. 20, killed 6. To recapitulate even the main features of these calamities, and of others the morals of which are equally instructive, would require a four-column reprint of our monthly reviews, and the reader must therefore be referred to those for further details. The total number of deaths charged to these nine accidents is 112; 100 were passengers, this number being equal to 50 per cent. of the total number of passengers killed in train accidents.

Except as noted above, the year 1891 does not seem to be specially noticeable, as compared with its predecessors, unless perhaps it is in the fact that America is beginning to have train accidents under the block system, and where signals are interlocked, as well as under the older and more familiar conditions. It is not necessary to repeat here the obvious truth that discipline is a vital element in railroad working, even with the most perfect appliances, nor to warn railroad managers that the introduction of these safeguards, greatly enhancing the safety of trains, does not absolve them from attending conscientiously to other well known requirements which are essential to perfect service.

Whatever may be said about the inefficiency and the evil connected with state control of railroads in this country (and much may be said), there is undeniably one great reason why there ought to be a railroad commission, composed of gentlemen of high character and suitable training, in every state, and that is to give publicity to railroad affairs. This need is not a new one, and we are not unmindful of the obstacles to successfully meeting it; but in three of the serious accidents just recounted, as well as in a number of lesser cases, it was especially apparent. The bridge disaster near Charlestown, W. Va., on July 4, was undoubtedly the result of causes which are disgraceful to all concerned in them, whether it be the owners of the road, the state which regulates (or should regulate) it, or the railroad profession generally; but West Virginia has no railroad commissioners, and no careful or thorough investigation seems to have been made. The Aspen Junction case was also one that ought to have been fully aired by a technical expert. Colorado has a railroad commissioner, but it appears that the law which was intended to clothe him with authority does not amount to much. North Carolina has a board of railroad commissioners (comparatively new), but the public is still waiting for their report on the Statesville disaster. This case especially demanded impartial investigation by a public body for the reason that aspersions were cast upon the motives of the railroad officers, and their attitude toward the public. Ohio, in which occurred the Ravenna collision, not thoroughly investigated, and the Kipton collision, the lesson of which was not properly set forth, has a railroad commissioner and he is assisted by an inspector, but both men apparently lack the time, the authority or the special ability to unravel the intricate and sometimes obscure causes of disasters which result from negligence in several different departments. Maryland stands in need of a railroad commission for the same reason that West Virginia does, a disgraceful trestle failure having occurred at Fallston in that state in April.

Accidents on "dummy" railroads, as also collisions between the trains of ordinary team railroads and those of electric street car lines, have come to be of frequent occurrence, and the question arises every month whether some accident of this kind should not be included in our record. In Alabama where "dummy" roads are numerous they are not treated by the railroad commissioner as full-fledged railroads. The increase of street car lines, and the high speed at which the cars are run, makes every demand for a grade crossing with a steam railroad a serious matter. These demands have been stoutly resisted by conservative railroad managers, but county and municipal authorities have not thus far evinced an adequate appreciation of the danger. If they continue to permit the laying of tracks across railroads at any and every street where there is a demand for them railroad officers will have to face the question of interlocking signals at such crossings.

The classification of the casualties of 1891 according to the kind of accident in which they occurred is as follows:

KILLED.	Employés.	Passengers.	Other persons.	Total.
In collisions	299	108	31	411
In derailments	208	67	29	304
In other accidents	43	2	..	45
Total	550	177	63	790

KILLED.	Employés.	Passengers.	Other persons.	Total.
In collisions.....	874	409	34	1,317
In derailments.....	542	769	29	1,331
In other accidents	31	5	1	37
Total	1,447	1,183	55	2,685

KILLED.	Employés.	Passengers.	Other persons.	Total.
Total 1890	1,519	1,224	60	2,812
Total 1891	978	745	49	1,772
Total 1892	1,098	1,012	94	2,204
Total 1893	890	916	140	1,946

The number of persons killed and injured in train ac-

TRAIN ACCIDENTS—THEIR NATURE AND CAUSES, FOR NINETEEN YEARS.

	1891.	1890.	1889.	1888.	1887.	1886.	1885.	1884.	1883.	1882.	1881.	1880.	1879.	1878.	1873-7†
TRAIN MILEAGE in the U. S. in millions of train miles*															
Rear	555	485	379	404	362	338	316	288	412	385	360	274	206	142	155
Butting	294	323	200	311	309	137	120	138	177	160	140	141	86	70	98
Crossing and miscellaneous	296	223	110	89	26	36	28	27	39	38	21	23	19	8	43
Total collisions	1,137	1,041	749	804	700	501	464	445	630	581	536	437	310	220	295
DERAILMENTS:															
Broken rail	39	38	32	61	50	45	102	60	84	37	85	45	56	17	71
Loose or spread rail	68	41	28	42	31	81	63	68	88	72	29	21	19	20	31
Broken bridge or trestle	61	38	42	40	39	30	32	34	35	38	44	16	17	21	24
Broken or defective switch	38	33	10	29	25	7	15	9	12	2	5	3	1	9	9
Broken or defective frog	11	12	7	16	7	29	11	11	1	4	2	2	2	5	5
Other defects of road	2	2	1	1	2	1	1	1	1	3	4	1	1	1	3
Total defects of road	211	167	130	185	152	174	223	182	227	156	160	89	94	72	149
Broken wheel	30	37	28	48	27	37	41	22	40	33	65	21	21	5	22
Broken axle	60	59	48	44	45	62	48	50	60	52	50	30	38	18	32
Broken truck	38	26	29	27	8	14	18	12	21	14	10	7	11	13	10
Failure of coupling or drawbar	29	7	5	7	4	3	6	3	2	1	1	2	4	1	4
Fall of brakebeam	27	12	9	9	6	10	.....	.....	3	3	0	5	2	1	4
Other defects of equipment	25	18	10	13	6	.....	.....	.....	3	3	1	1	1	1	1
Total defects of equipment	215	158	120	148	100	122	123	67	129	102	124	64	66	41	76
Misplaced switch	78	54	34	70	49	68	55	82	90	90	85	80	80	48	76
Negligence of br'men or b'dgemen	8	10	3	4	4	4	4	3	9	9	12	4	5	5	9
Runaway engine or train	0	10	8	14	6	.....	.....	3	1	1	1	5	1	2	1
Open draw.	3	5	1	4	0	3	0	3	4	4	2	1	4	4	4
Other negligence	38	22	19	26	12	.....	.....	2	9	1	4	8	3	6	6
Total negligence in operating	141	108	92	117	74	76	64	94	112	101	104	96	90	65	97
Animals on track	61	56	41	57	32	56	25	24	45	48	42	43	35	30	48
Snow or ice	6	5	22	6	27	30	7	13	5	15	8	12	13	20	20
Wash-out	19	18	20	19	11	23	22	25	25	28	18	17	11	36	28
Loudalide	25	24	34	16	21	7	18	16	7	14	4	7	4	6	6
Accidental obstruction	30	28	8	26	31	17	17	42	53	37	45	25	91	26	38
Malicious obstruction	45	40	20	11	12	15	13	12	17	13	8	11	15	15	15
Switch or rail purposely misplaced	11	10	0	22	12	24	13	17	16	21	4	6	9	13	9
Other unforeseen obstructions	6	13	8	6	9	4	6	3	19	7	3	3	1	3	3
Total unforeseen obstructions	195	191	131	103	129	167	135	152	190	144	150	108	113	125	158
Others	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	1	2	3	5	5
Unexplained	430	377	296	386	243	192	130	186	250	238	310	237	192	175	223
Total derailments	1,304	1,004	759	1,062	705	641	681	681	928	741	837	597	557	481	709

RECAPITULATION.

Collisions	1,137	1,041	749	804	700	501	464	445	630	581	536	437	310	220	295
Derailments	1,204	1,004	759	1,032	705	641	681	681	926	741	837	597	557	481	709
Other accidents	103	101	61	59	86	60	72	65	84	62	65	44	43	39	61
Total	2,414	2,146	1,500	1,935	1,491	1,211	1,217	1,191	1,640	1,364	1,458	1,078	910	740	1,067

Train mileage is taken from Poor's Manual, which gives revenue mileage only; that for 1891 is estimated.
† Average per year, five years, 1873 to 1877, inclusive.

CASUALTIES TO PASSENGERS AND EMPLOYEES IN TRAIN ACCIDENTS IN 1891.

Tabulated According to Classes of Causes.

Month.	Defects of road.		Defects of equipment.		Negligence in operating.		Unforeseen obstructions and maliciousness.		Unexplained.		Total.	
	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.	Pass.	Emp.
January	26	3	4	7	2	7	8	8	61	23	83	9
February	21	4	21	1	26	12	7	8	1	4	16	8
March	36	4	33	10	10	4	7	12	16	35	37	52
April	16	8	5	2	3	1	5	13	32	57	31	42
May	14	1	3	6	1	5	13	37	73	11	13	10
June	11	8	6	2	8	1	19	20	50	54	10	23
July	17	55	3	4	1	6	37	52	15	52	3	12
August	1	8	3	5	4	21	18	76	19	105	19	71
September	1	19	1	1	4	5	50	26	70	7	5	18
October	20	3	5	3	3	11	40	27	60	3	1	2
November	2	7	2	2	5	15	49	37	104	2	3	10
December	1	76	6	22	14	3	16	42	88	2	10	25
Year	26	291	45	103	7	90	42	65	114	158	345	230
Year 1890	19	195	61	126	4	86	30	77	115	324	337	950
Year 1889	16	167	30	81	7	58	24	63	46	291	189	595
Year 1888	7	195	45	153	16	65	35	92	388	217	573	110
Year 1887	139	406	48	142	11	50	39	57	48	279	215	488

* Included in unexplained.

Incidents during the past 10 years, as tabulated in our accounts, was as follows:

Killed.	Injured.	Train mileage, million train miles.	No. persons killed per million train miles.	CAUSES OF COLLISIONS.
1891	790	2,685	875.0	1891. 1890. 1889. 1888. 1887. 1886. 1885.
1890	806	2,812	793.9	Train breaking in two... 96 65 82 67 55 81 65
1889	192	1,772	622.0	Misplaced switch... 78 93 50 61 44 41 33
1888	667	2,204	688.8	Failure to give or to observe signals... 153 89 56 62 58 30 17
1887	636	1,946	644.0	Mistake in giving or understanding orders... 88 73 46 40 42 27 37
1886	416	1,409	500.8	Miscellaneous... 259 243

from the French border along the Mediterranean to Barcelona and Tarragona suspended all joint rates between French and Spanish stations, and all through tickets and way bills, so that everything had to be transferred at the border, save a certain coal traffic. The wine shipments over this route in 1890 amounted to 91,000 tons, all but 300 tons of which were charged by the special joint tariff. During the same year, the exports from France into Spain over the route amounted to 135,600 tons of coal and 62,000 tons of other freight, most of which was carried under special tariffs at less than the regular rates.

The Russian railroads have been accustomed to give free passes not only to their employés, but to relatives of their employés—a practice which may possibly have been heard of on this side of the Atlantic. The term "relatives," however, has been found to be extremely elastic, and recently the Great Russian company put its foot down and issued positive orders that hereafter passes will be granted to no other relatives of employés than their wives, though a trifling reduction of 70 per cent, on the prices of tickets will be made to the parents, brothers and sisters of employés and of their wives; but all aunts, cousins and stepmothers must pay full fares. If your brother receives a salary of as much as 1,500 roubles (\$750) from the company, you can get your discount only on first-class tickets; if he has from 300 to 1,500 you have second-class tickets; if less than 300 roubles, third-class tickets. This must give the railroad employé a great advantage as a suitor for one of a large family of children, especially if the boys are commercial travelers.

The Prussian Minister of Public Works has recently given instructions that hereafter on the state railroads freight engines must be made to haul all the cars they can; that is, that light freight trains shall not be run as they have been heretofore on almost all lines. In level districts the ordinary load for a standard freight locomotive is regarded as from 120 to 150 axles; that is, from 80 to 75 cars of 22,000 lbs. capacity. From the coal mines heretofore light trains have been run commonly on Sundays and Mondays, because on those days not coal enough was raised to make full trains. As a result of the new order, it is said that nearly all the coal will be shipped on five days of the week.

A committee of the Massachusetts legislature has recently held a hearing on the proposition to restrict by law the issue of free passes on railroads, which was a topic in the Governor's inaugural address, but there seems to have been very little interest taken in the subject, the attendance being small. It is said that a member of the legislature two years ago received 150 passes from a certain road at one time. Another member, in expressing his surprise at the failure of the voters to re-elect him, is reported to have said that he "got railroad passes for all his constituents who asked for them."

Nine or more men were killed at a street crossing in the outskirts of St. Louis on the night of Jan. 19, and a half dozen or more were injured. The accident occurred at the Sarah street crossing of the Wabash road, and the engine was running tender first. Nearly all the party, who were in a large sleigh, had been drinking, but it is claimed that the driver was sober. The night was very cold and he was heavily muffled.

The Pennsylvania limited is now hauled out of Pittsburgh westward by two engines, a mail car having been recently added to the train. It is said that the large demand for steam in the cars, for heating and other purposes, was the straw that finally broke the camel's back.

NEW PUBLICATIONS.

Journal of the Association of Engineering Societies.
December, 1881.
The principal paper in this issue is by Mr. A. Gottlieb on the "Foundations and Floors for the Buildings of the World's Columbian Exposition." This paper and the discussion fill 28 pages of the magazine and treat pretty carefully the problems arising and the methods by which they were met. There is a short paper on a "New Method of Calculating Areas in Land Surveying," and considerable space is given to the continuation of the discussion of Mr. Corthell's paper on "An Improved Waterway Between the Great Lakes and the Atlantic Seaboard."

Transactions of the American Society of Mechanical Engineers., Volume XII, November, 1880, June, 1881. It would be superfluous and would take an unwarranted amount of space to attempt to give an abridgment of the tables of contents of this volume, which contains probably 40 different papers, with discussions and minutes of proceedings. The list of illustrations alone contains 334 titles.

TRADE CATALOGUES.

Illustrated Catalogue No. 1, American Steel Wheel Co.
New York.
The chief product of this company is solid steel wheels, although they make also steel drawbars, buffers and levers of the Miller type, and steel gear wheels and other special castings. The method of casting the solid

steel wheel made by this company, that is the Richards process, has been quite fully described in the *Railroad Gazette*. Among the wheels illustrated in the catalogue are a locomotive driving wheel, a 30-in. spoke, truck wheel, 33 and 36-in., plate, passenger car wheels. The company also makes wheels for street and electric railroads.

Notes on Power Plants for Electric Railways and Electric Lighting. Westinghouse, Church, Kerr & Co., New York.

This little pamphlet is of more than usual interest because of the careful description and discussion of methods. There is a brief historical preface, in which it is stated that the Westinghouse Machine Co. was the first builder of direct connected dynamos in the United States, if not in the world. There are chapters on divided versus concentrated power in railroad work, and on uniform high duty under variable load, which are well worth careful reading.

General Catalogue of Contractors' Tools and Machinery. Thomas Carlin's Sons, Allegheny, Pa.
This is a catalogue of 188 pages with an alphabetical index. It shows a great variety of machinery, including hoisting engines, derricks, cranes and all the principal apparatus used by building contractors.

Facilities for the Interchange of Traffic Under the Interstate Commerce Act.

BY LAWRENCE GODKIN.

(Continued from page 81.)

such statutes, or received with all the weight of an authority.⁴

But there are some important differences in the language of the English and American statutes, and one of these differences is pertinent here. The British statutes forbid common carriers from making undue or unreasonable preference in favor of each other or subjecting each other to undue or unreasonable prejudice or disadvantage. But the British statutes contain no absolute requirement that common carriers shall give each other equal facilities. The matter is left to the broad discretion of the Commissioners, and provided that the preference or advantage given by one common carrier to another be not undue or unreasonable, the act imposes no absolute duty that the facilities provided shall be equal. But the American statute goes further.

It prohibits undue and unreasonable preference or advantage, prejudice or disadvantage, in language substantially similar to that used in the British statute, and then in addition in a separate but connected paragraph it imposes the absolute duty upon carriers of affording each other equal facilities for the interchange of traffic and forbids discrimination between connecting lines; omitting the qualifying word "unjust," which is prefixed to the word "discrimination," when it is used in the second section of the Act. This difference between the English and American acts has, however, been deprived of some of its force, for by a recent dictum of the Interstate Commerce Commission it would appear that the second paragraph of the third section will be construed as being qualified by some such words as "under substantially similar physical conditions."⁵

There are some general considerations to be borne in mind in construing any of the second, third or fourth clauses of the Interstate Commerce Act, and one of these is the weight to be attached to the consideration of public convenience. For instance, a complaint against a common carrier for violation of the duties in regard to interchange of traffic imposed by the third section of the Act, may be preferred by another common carrier, or by any other person or corporation; but in determining the question raised the tribunal has to consider the convenience of the public as well as the grievance or defense of the immediate parties to the proceeding. It has been repeatedly held in England that their Railway and Canal Traffic and Regulation of Railways Acts were passed for the public benefit and not for the benefit of individuals. And Lord Chief Justice Cockburn stated the rule to be that to justify a party in calling upon the Court to enforce the provision of the Act, it was not indispensably necessary to show a case of individual grievance, but that a case of public inconvenience must be made out.⁶ And by the Regulation of Railways Act of 1888 (51 and 52 Vict., C. 23) it is provided that any of an enumerated list of authorities, including any association of traders or freighters, or chambers of commerce or agriculture, etc., may complain to the Railway Commission "without proof that such authority is aggrieved by the matter complained of" (Sec. 7).

Our Interstate Commerce Act contains an analogous provision in the fifteenth section, where it is provided that where a complaint is made to the Commission of a violation of the Act, or of any law cognizable by the Commission, "or that any injury or damage has been sustained by the party or parties complaining, or by

other parties aggrieved in consequence of any such violation," the Commission may act.

The cases cited show the paramount importance which the English tribunals have attached to the necessity of the public convenience being affected in order to invoke their powers under the Railway & Canal Traffic and Regulation of Railways Acts. The Interstate Commerce Commission has not yet had occasion to utter any decision holding the necessity of the existence of a public inconvenience to move it to redress an individual or corporate grievance, but it has declared that the part of the third section of the Act which relates to interchange of traffic was intended "for the public benefit more particularly than for the benefit of the carriers themselves."⁷

Leaving this, however, and coming to the question of what carriers are subject to the third section of the Act, we find that by its terms it is made applicable to "every common carrier subject to the provisions of this Act," i.e., to every common carrier engaged in interstate commerce. It is not proposed to discuss here what constitutes interstate commerce within the meaning of the Act. But as in every interchange of traffic there must be two or more carriers engaged, a few principles of jurisdiction have been established which relate particularly to the relations of carriers in the interchange of traffic under the third section. As, for instance, where the question as to facilities for the interchange of traffic arises between a common carrier engaged in interstate commerce and a common carrier not engaged in interstate commerce, the Interstate Commerce Commission has held that the section does not apply, for the reason that the duties and obligations sought to be imposed upon the carrier in such case cannot be made reciprocal. "In the absence of express language to that effect, it cannot be inferred that Congress intended to require a common carrier engaged in interstate commerce to extend the valuable aid and facilities enumerated in this clause to another common carrier, operating a connecting line, which is not subject to the provisions of the Statute, and which cannot be required to make any return whatever on its part in the shape of similar services and facilities to the interstate carrier from which it has received these benefits."⁸

If, however, the Commission were to apply the English view that the statute was passed for the benefit of the public and that the public convenience is the paramount consideration, the reasoning above quoted would lose much of its force. In a previous decision the Interstate Commerce Commission, while denying its authority to compel a rail carrier subject to its jurisdiction to make a joint through rate with an independent carrier by water, uttered a dictum to the effect that such rail carrier could not decline to receive from or deliver freight to connecting water lines.⁹ And yet there may be just as great a lack of reciprocity in the latter case as in the former, for there is nothing at common law to compel a carrier by water, which is not within the jurisdiction of the Interstate Commerce Act, to receive from or deliver freight to a connecting rail line.¹⁰ And inasmuch as the act directs common carriers to afford "all reasonable, proper and equal facilities for the interchange of traffic," etc., if the public convenience demands a through rate, and this consideration is of paramount importance, it would not seem to be an answer to say that the water carrier cannot be compelled to reciprocate. As far as the public convenience is concerned, half a loaf is better than no bread, and the fact that the public cannot have through rates in both directions is no good reason why it should not have them in one direction. However, as far as through rates are concerned, there is another and stronger reason why the Interstate Commerce Commission cannot compel the establishment of through rates; and this reason applies whether both the carriers or only one of them is within the jurisdiction of the Act. But this reason will be considered later.

In the Capehart case, above cited, it was also held that the third section of the Act did not apply to the case of a carrier entirely by water, for the reason that the use of the words "tracks and terminal facilities" precluded by implication the application of the section to any but all rail carrier or a carrier part rail and part water.¹¹

A similar exception of carriers by water from the operation of the Railway & Canal Traffic Act of 1884 was made by the English Railway Commissioners, though for different reasons. It was sought to compel a railway line terminating at the sea to make the same arrangement with one steamboat owner for carrying its goods and passengers across the sea as it had made with another steamboat owner; but the petition was refused, the Commission saying in substance that the railway had a right to use its discretion and prefer one vessel to another, "a safe to an unsafe vessel, or responsible owner to limited liability company or men of straw."¹²

A contrary view, however, of the right to discriminate between steamers was taken by the United States Cir-

⁴ McDonald vs. Hovey, 110 U. S., 619.

⁵ New York & Northern R. R. Co., et al. N. Y. & N. E. R. R. Co. et al. 4 I. C. 729, 721.

⁶ Headl v. Eastern Counties R. Co. 1 Railway & Canal Traffic Cases, 56.

Caterham R. Co. v. London, Brighton & South Coast R. Co. Ditto, 32.

Palmer v. London, Brighton, etc. R. Co. Ditto, 27.

Painter v. London, Brighton, etc. R. Co. Ditto, 38.

Barrett v. Gt. Northern & Midland R. Co's, 1 Railway & Canal Traffic Cases, 43.

⁷ In re Chicago, St. P. & Kansas City Ry. Co. 2 C. C. R. L. 259.

⁸ Capehart v. Louisville & N. R. Co. et al. 4 I. C. C. R. 215, 274.

⁹ In the Matter of Joint Water and Rail Lines, 2 I. C. C. R. 645, 647.

¹⁰ Atobison, Topeka & Santa Fe R. T. Co. v. Denver & New Orleans R. Co., 110, U. S., 607.

¹¹ Capehart v. Louisville & N. R. R. Co. 4 I. C. C. R., 265.

¹² Napier v. Glasgow & Southwestern Ry. Co., 1 Railway & Canal Cases, 222, 204.

cuit Court of Alabama, and its decision apparently approved by the Interstate Commerce Commissioners.¹³

The Interstate Commerce Commission has also expressed its opinion that express companies organized and operated independent of railroads are not subject to its jurisdiction.¹⁴

Coming now to the question of what are the "facilities" which must be reasonable, proper and equal, and accepting the ordinary definition of the word, to wit, the means by which the performance of a thing is rendered more easy, it is evident that the word in its application to interchange of traffic may mean a number of different things. It includes actual physical facilities for transferring traffic from one railroad to another, station accommodations and the like, convenient arrangements for taking over traffic, good service on the railroad of the transferee of the traffic, such as sufficient and proper cars and convenient trains. It also includes facilities of a different nature, such as through bills of lading for freight or through tickets for passengers and through rates. The qualifying and limiting clause "according to their respective powers" which is contained in the section under discussion is copied from the English statute. The powers referred to are the powers which the common carrier derives from its charter or act of incorporation.¹⁵

The carrier's charter is of course the measure of its powers, and it could not be compelled to afford facilities which would be *ultra vires*. The English Railway & Canal Traffic Act of 1854 provides that in the construction of that act the word "railway" shall include stations. This would seem to be rather an unnecessary definition, and there can be no doubt that under our act the word would be held to include stations. But after the most elaborate consideration which has been given to the meaning of the word "facilities," the Court of Appeal in England held that this definition only included existing stations, but while there was no power in the Railway Commissioners to order a railway to make a new station, it was within their power to make an order for facilities which would necessitate the making by the company of structural alterations to existing stations.¹⁶ This might appear to be rather a fine distinction; but, be that as it may, it would seem to be the law under our act as well as under the English statutes, that the Commissioners have no power to compel a railway company to establish a new station yard depot in a new place. As expressed by Judge Jackson in the Kentucky and Indiana bridge case, the act to regulate commerce deals with common carriers as it finds them, and leaves to them full discretion as to what extensions they will make of their lines, the connections they may form and the yards and depots they may choose to establish. They are not compelled to make new station yards or depots, even though such additional construction might be for the convenience of the public or of other carriers (7 Fed. Rep., p. 64).

It sometimes happens in respect to interchange of traffic that the interchanging carriers are not able to agree as to the arrangement which shall be made between themselves for the interchange. In such case the interesting question arises whether they can be compelled to come to an agreement. The English Railway Commissioners have twice held that they could be.¹⁷ But the Exchequer Division of the High Court of Justice held otherwise, and restrained by writ of prohibition the order granted by the Commissioners in the case last cited.¹⁸ And Baron Cleasby laid down the proposition that the Commissioners had no power to compel two railway companies to act jointly in doing what neither company has power to do separately. One of the things which it was sought to compel the companies to do in this case was to interchange traffic at a junction. If this decision of Baron Cleasby is sound it will at once be seen how it weakens the provisions of the Act in respect to compelling facilities for the interchange of traffic. A similar difficulty, as will be shown hereafter, arises under the Interstate Commerce Act in regard to compelling facilities by through rates.

In respect to the power of one carrier to compel another to furnish proper and convenient service for the interchange of traffic under the English decisions, it is a question of whether or not the existing service meets the fair requirements of the public.¹⁹ Here, again, we have an illustration of the importance in the eyes of the English tribunals having jurisdiction of the regulation of railways of the consideration of public convenience. In general, it may be said that everything is a "facility" which tends to render more expeditious and easy the transfer of traffic from the point of shipment to the point of destination, and, subject to the exceptions which have been alluded to, one carrier may require

from another all facilities for the interchange of traffic which are in the railroad's powers, which do not demand the construction of new station yards, depots or railroads, and which are demanded by the public convenience.

When, however, we come to the question of facilities by through billing and through rates, we are met with two difficulties under the American statute. Of these, one arises from the failure of the Interstate Commerce Act to provide the machinery for establishing a through rate where the carriers are unable to agree upon its terms, and the other from the want of jurisdiction of the commission over intrastate carriers. The English Regulation of Railways Act of 1873 (section 11) after declaring that the word facilities shall include the forwarding of through traffic at through rates, provides that if the company requiring the traffic to be forwarded and the forwarding companies cannot agree upon the rate or the route, and the forwarding companies object to the rate or route proposed "the commissioners shall consider whether the granting of the rate is a due and reasonable facility, in the interest of the public, and whether, having regard to the circumstances the route proposed is a reasonable route, and shall allow or refuse the rate accordingly." The right to apply for through rates under this section is not confined to the companies owning lines at the two ends of the through rate, but extends to an intermediate company and to steamship companies.²⁰ But there is no similar or analogous provision in the Interstate Commerce Act, and where one of two or more interchanging carriers declines to establish through rates with the others, the Interstate Commerce Commission has held that it has no power to compel the establishment of such rate because it has no power to itself determine and apportion the rate.²¹ But in the case of the New York & Northern R. R. Co. vs. New York & New England R. R. Co. et al. the Interstate Commerce Commission held that where a carrier had once established a through rate with a forwarding carrier, which rate was reasonable and satisfactory to both railroads, it could not discontinue this through rate with that carrier and establish it with another forwarding carrier operating an alternative route to the same point of destination, for that would constitute a case of unjust discrimination and a refusal of equal facilities which the Commission has power to forbid.²²

To put it briefly, as the law at present stands it would seem that an interstate carrier may refuse to establish a through rate; but once established, it cannot discontinue the rate with one carrier and give it to another. The Interstate Commerce Commission has several times called attention to its want of power to compel interstate carriers to give through rates, and has recommended that the Interstate Commerce Act be amended in this regard.²³

The other difficulty in the way of the establishment of through rates and routes is the result of the limitation of the Interstate Commerce Commission's jurisdiction to carriers engaged in interstate commerce. It has been claimed that this enables state roads to refuse to join with interstate roads in making through rates and routes. In its last annual report, however, the Commission has expressed the opinion that whenever the state road gives, receives or acts upon through shipping bills or carrier traffic whose destination is distinctly known to be a point beyond the state boundary, such state road becomes subject to the jurisdiction of the Interstate Act, and this is probably the law.²⁴

The object of the interchange of traffic clause of the Interstate Commerce Act was to prevent carriers from imposing upon the public the burden of the loss and inconvenience resulting from the carrier's own rivalries and contentions. And from an examination of the law as it stands, it will be seen that in so far as the Act has fallen short of accomplishing this object, its failure is due to the omission to include within its jurisdiction carriers entirely by water, and the omission to give the Commission the necessary authority to make arrangements between the carriers for the interchange of traffic, when they are unable to agree upon the terms of such arrangements among themselves. Nor does there seem to be any good reason why the Third section should not be amended to remedy these omissions. For, whatever difference of opinion there may be in regard to the desirability of the clauses of the Act prohibiting pooling and regulating charges for long and short hauls, there can be little question in regard to the salutary operation of the clauses designed to facilitate the interchange of traffic and prevent discrimination by carriers against each other.

¹³ Samuels vs. Louisville & N. R. R. Co., 31 Fed. Rep., 57. N. Y. & Northern Ry. Co. vs. N. Y. & N. E. R. Co. 4 L. C. R., 718, 719.

¹⁴ First Annual Report, 1 I. C. C. R., 273-277.

Second Annual Report, 2 I. C. C. R., 402-404.

¹⁵ Tharsis Sulphur Co. v. London, etc., R. Co., 3 R. & C. Traffic Cases, 455.

¹⁶ Southeastern R. Co. v. Ry. Commissioners and Corporation of Hastings, 3 R. & C. Traffic Cases, 464.

¹⁷ Victoria Coal & Iron Co. vs. Neath & Brecon R. Co. et al. 3 R. & C. Traffic Cases, 37.

Toomer v. London, Chatham, etc., Ry. Co. et al. 3 R. & C. Traffic Cases, 78.

¹⁸ Toomer vs. London, Chatham, etc., Ry. Co. et al. 3 R. & C. Traffic Cases, 39.

¹⁹ Caterham Ry. Co. vs. London, etc., Ry. Co. 1 C. B. (N. S.), 410.

²⁰ Central Water & Carmarthen Ry. Co. vs. Great Western Ry. Co., 2 R. & C. Traffic Cases, 191. Greenock & Wemyss Bay Ry. Co. vs. Caledonian Ry. Co., 2 R. & C. Traffic Cases, 237.

²¹ Central Water & Carmarthen Junction Ry. Co. et al. vs. Great Western Ry. Co. et al., 4 R. & C. Traffic Cases, 110.

²² Little Rock, etc., R. Co. vs. East Tennessee, etc., R. Co., 3 I. C. C. Rep., 1. Mattingly vs. Penn. Co., 3 I. C. C. Rep., 592. Lehmann Higginson & Co. vs. S. Pacific Co., 4 I. C. C. Rep., 1.

²³ N. Y. & Northern R. Co. vs. N. Y. & New England R. Co., 4 I. C. C. Rep., 702.

²⁴ Little Rock & Memphis R. Co. vs. East Tennessee, etc., Co., 3 I. C. C. Rep., 1. Third An. Rep. Interstate Com. Commission, 3 I. C. C. Rep., 432.

²⁵ Fourth Annual Rep., 4 I. C. C. R., 400. Baird vs. St. Louis L. N. & S. Ry. Co., 41 Fed. Rep., 302.

TECHNICAL.

Manufacturing and Business.

The Wehn Pavement Co., of 16 Exchange Place, New York, has been laying lithogen pavements for platforms during the past year for the Louisville & Nashville, the Cleveland, Columbus & Akron, the N. Y. C. & H. R., and N. Y., N. H. & H. railroads. This work includes depots at Louisville, Akron, New York and Fordham, N. Y. At the latter place about 14,000 sq. ft. of platform was laid, the material being stained to a slate color. Here there was a curb 30 in. high which was quite difficult to lay owing to the platform not being much lower than the station, and also from the fact that there was a curve at this point to which the platform must conform.

G. W. Cushing, formerly Superintendent of Motive Power of the Northern Pacific, the Philadelphia & Reading and the Union Pacific, has been elected General Superintendent of the American Steel Wheel Co., in charge of the mechanical department of the company at South Boston and of the new works to be erected in New Jersey. His office will be at South Boston, Mass.

Testing Air Brakes.

A rule has been adopted on the Southern Pacific in Texas requiring enginemen, both passenger and freight, to make a trial application of the air brakes after starting the train and before attaining a speed of more than six miles an hour. This is to be done at the beginning of the trip and whenever a car has been taken or left.

Steel Tired Car Wheels.

The Master Car Builders' Association issues a circular on steel tired car wheels as follows: "The committee on steel tired car wheels requests you to furnish them the information on the subject indicated on enclosed blank form. It is desirable for this to cover all steel tired wheels which are now or have been in service under your car equipment. The return of this form, with information filled in, by March 1, will be appreciated by the committee. Address reply to: R. E. Marshall, Superintendent Motive Power, P. W. & B. R. R., Broad street station, Philadelphia." The questions on the blank are as to: Name of Wheel; Maker; Diameter, New, and Minimum allowed at Last Turning; Number in Service; Type of Centre, Cast, Wrought, Steel or Bolted; Defects, Character of, and Approximate Mileage Made Before Developed.

New Steamers for the Stonington Line.

A new Sound steamer, the "New Hampshire," for the Stonington Line, was launched at the yards of Harlan & Hollingsworth on Jan. 16 last. A sister ship, the "Maine," for the same company, was launched last October. The two vessels are built and are to be fitted up exactly alike. The hulls are divided into seven watertight compartments and their general dimensions are 302 ft. 7 in. length at water line; 310 ft. length over all; 41 ft. breadth of beam at load water line; 60 ft. width over guards; draft, 12 ft. 6 in. The engines are of the inverted, direct acting, triple expansion type with surface condensers attached. The cylinders are four in number, one of 28 in. diameter, one of 45 in. diameter and two of 51 in. diameter. The stroke is 42 in. The propeller is of cast iron, 18 ft. 6 in. in diameter, four-bladed and left handed.

The boilers are four in number of the Scotch type, each 13 ft. 6 in. diameter and 11 ft. 6 in. long. They are of steel with a tensile strength of 60,000 lbs. to the square inch and have three furnaces each of the corrugated type. The diameter of furnaces is 46 in., the length of grate 6 ft. The steam pressure to be carried is 100 pounds to the square inch. They are to be fitted to be operated either with forced or ordinary draft.

The rudder will be operated by the Williamson combined hand and steam steering gear. Both vessels are expected to be ready for service by May next in time for regular summer service.

Car Lighting.

A contract for 120 passenger coaches just let by the Chicago & Northwestern and the "Omaha" roads specifies that they shall be equipped with Pintsch gas. The material for this equipment will be delivered as rapidly as necessary, the delivery of the cars to begin next August.

The Armor-Plate Test Completed.

The last two armor plates of the eight ordered for competition were tested at the Indian Head proving grounds on Wednesday, the 13th of the present month. They were furnished by Carnegie, Phipps & Co. Unfortunately both plates were imperfect; one, a low carbon alloy plate was warped in the tempering and afterward planed down to a level backing, leaving it thinner in some portions than in others, the thickness varying between 9 and 10.5 in. A second plate of high carbon nickel steel cracked at one end under treatment and was reduced some 20 in. in its length. Both plates were Harvey treated, and on account of the reduction in area of the second plate, it was only subjected to four instead of the usual five shots. The latter plate being of smaller area than the other was subject to harsher treatment owing to the closeness of the shots to each other. These shots were fired in a triangular shape, and the fourth or final 8-inch shot was fired at the centre of the triangle. The 8-inch projectile passed through both plate and backing and penetrated deep into the sand beyond. Cracks separated the plate into three pieces, each piece

having a portion of two of the outer holes and a one-third share of the centre hole. The central 8-inch shot penetrated the low carbon all steel plate and its backing, leaving prominent cracks connecting the holes of the first, fifth and fourth shots. The only injury to the backing of the high carbon nickel steel plate was that due to the fourth or 8-inch shot as described.

The results of the trial of the two plates was quite favorable to the high carbon nickel steel plate, and as a result of the whole series of plate trials, it would appear that a high carbon nickel steel Harvey treated plate is the best for armor purposes. Improvement in the plates is expected with increased experience in the application of the Harvey treatment and in the tempering.

Delicate Chronographs.

At a recent meeting of the French Physical Society, Mr. W. Schmidt described several forms of chronographs capable of measuring down to the ten-thousandth part of a second. These devices have been applied, with good results, to the measurement of the initial velocities of projectiles, and also to the time occupied by bodies falling through short distances.

New Ore Dock at Two Harbors.

The Duluth & Iron Range Railroad has received a large number of bids for building its new ore dock at Two Harbors, Minn. It will be 400 ft. long, and will increase the dock shipping capacity of the road to about 1,300,000 tons of ore a year. It will be 5½ ft. high and will cost about \$175,000.

Ferry-Boats For Sale.

The Grand Trunk Railroad has advertised for bids for the purchase of one or both of the ferry-boats, "Huron," and "International," now lying at Point Edward, Ont., formerly used for transferring cars between Point Edward, Ont., and Fort Gratiot, Mich. The dimensions of the boats are as follows: "Huron"—Length of hull, 235 ft.; length over all, 230 ft.; depth, 15 ft. The cylinders are 30 x 30, and boilers of locomotive type with high pressure engine. "International"—Length of hull, 230 ft.; length over all, 228 ft.; depth, 15 ft., with engines and boilers similar to the "Huron." The boats have three tracks, and carry 18 cars each.

Automatic Block Signals.

The Westinghouse automatic electro-pneumatic block signal system now in use on the four-track line of the Central of New Jersey between Jersey City and Newark Bay, 10 miles, is to be extended to Bound Brook, 31 miles from Jersey City, the contract having already been given out. This will complete the equipment of that portion of the road used by the fast trains between New York and Philadelphia. The pile bridge across Newark Bay, which is about two miles long, will be equipped with a large number of signals, so as to make very short block sections. From the west end of the bridge to Bound Brook the sections will be about 3,000 ft. long.

Electric Drilling in the Bed of the Mississippi.

Undoubtedly the rock drilling that has been done by electricity in the bed of the Mississippi River, between Rock Island and Moline, Ill., signalizes the completion of the largest contract of the kind thus far undertaken. The electric drilling at Rock Island was done under the terms of a contract made with the Government of the United States by the Thomson-Van Depoele Electric Mining Co. The Government, which owns Rock Island, has for some time been engaged in the work of deepening a portion of the southern channel of the Mississippi. This is done with the two-fold purpose of securing a more plentiful supply of water power, which is used at the shops on the island, and to provide a navigable channel at Moline.

A coffer-dam was erected at the head of the island at a cost of about \$25,000, and the Government is now deepening a channel 400 ft. wide to the extent of 4 ft. The particular portion of the work on which electricity was employed is a strip of limestone 600 ft. long, with an average width of 50 ft. The remainder of the rock is a much softer sandstone, and can be profitably drilled by hand. It has been shown, however, that electric power only costs about half as much as hand drilling in the harder rock. Nine drills were used on the work. Eight of these were mounted on weighted tripods in the usual manner, while one, somewhat larger in size, was mounted on a carriage and wheeled about on a temporary track. The machines used were the regular Van Depoele reciprocating drills.

The current was obtained from a plant near the pumping station, the 25 H.P. engine of this latter being used. The generating plant consisted of dynamos 20 and 10 kilowatts capacity.

As to the practical and commercial results of the operation of these drills. The contract required that as many holes as were necessary should be drilled in the limestone rock to a uniform depth of 4 ft. The holes were made 1½ in. in diameter at the top and 1½ in. at the bottom, drills of three different lengths being used. Work was begun on Oct. 23, and on Dec. 10, 941 holes had been drilled, many of them exceeding by 2 or 3 in. the specified depth. This represented 3,784 ft. of drilling. The whole number of nine drills was not employed until the latter period of the work, however, and a carefully kept record showed that at the date mentioned the work had taken 1,085 drill hours. This gives an average of 3.6 ft. per hour. for each drill.—*Western Electrician*.

THE SCRAP HEAP.

Notes.

A Pittsburgh paper says that about 11,000 loaded cars now pass Altoona eastward weekly.

The Atchison, Topeka & Santa Fe is equipping a local passenger train with electric lighting apparatus.

The New York, New London & Norwich Transportation Co. was chartered at Portland, Me., last week. The capital stock is \$800,000.

There was a small strike of yardmen on the Louisville, St. Louis & Texas, at Louisville, Ky., last week, accompanied by some violence.

The *Railway News Reporter*, of Omaha, printed a boli day number of 56 pages, mostly filled with portraits and sketches of railroad men.

The strikers on the San Antonio & Aransas Pass road have admitted their defeat. They received no support from any of the large brotherhoods.

Senator Gallinger, of New Hampshire, has introduced a bill in Congress to allow the granting of passes to newspapers for advertisements and "other services."

On the morning of Jan. 21 the shops of the New Orleans & Southern at Poydras, La., were burned, together with 6 passenger and 3 freight cars. Total loss \$65,400.

A bill has been introduced in the Ohio legislature providing for the appointment of an "Examiner of Railroad Telegraphers" with a salary of \$1,200, to see that none but competent persons are employed as operators.

A freight conductor of the Elgin, Joliet & Eastern road, who was injured by falling when he grasped for a hand-rail which was defective from damage done to it in a collision some time before, has secured a verdict against the road for \$15,000 damages, after five trials.

The "Veterans' Association of the Employees of the Pittsburgh Division of the Pennsylvania Railroad" has been organized at Pittsburgh, with Robert Pitcairn, Division Superintendent, as President. The qualification for membership is either 21 years' service on the division or service upon it prior to April 1, 1865.

The Boston & Maine and Old Colony roads have recently taken out policies of insurance to cover their personal damage losses by accidents, and a Boston reporter bears that they paid \$250,000 premium. Whether this is for one or both roads and whether it is for one year or for some other time is not stated.

Spanish American Notes.

The Mogyana Railway Co., of Brazil, has petitioned for a concession to extend this line to Santos, agreeing to build a double track from Santos to Campinas. This road is owned and operated entirely by Brazilians, and now runs from point west of the city of Sao Paulo something over 250 miles to Ribeiro Preto. It is one of the few roads in Brazil which has proved profitable.

The Taital Railway Co., Chili, reports earnings during the past year of \$78,000, upon 18 miles of road. Reduction in traffic during the civil war was 75 per cent. from the previous year. No dividend has been declared.

Gross receipts from the Peruvian corporation's lines of railroad for December last amounted to \$175,330, as against \$128,800 for the same month in 1890. The increase in receipts since July 1, 1891, over those for the same period in 1890 has been \$47,950.

President Flores, of Ecuador, has issued a decree providing for the payment, after June 1, 1892, of 10 per cent. of the customs receipts from import duties to the representative of the foreign bondholders. This completes the transaction recently made with the government whereby the bondholders are to accept new issues of bonds, representing a face value considerably reduced from that of the original bonds, together with bonds on the government railroads. Although the creditors must pocket a large loss under this arrangement, the result is nevertheless much better than was anticipated several years ago. Under the circumstances, with the government's available resources strained to the utmost to pay interest upon a large national debt, and upon railroad bonds as well, we may be sure that future railroad building in Ecuador will not be undertaken for merely speculative purposes.

To be a foreign bondholder in Spanish America seems to mean to fall heir ultimately to the railroads of the country. This happened in Peru, and has in effect taken place in Ecuador. Now, Honduras has undertaken the discharge of her indebtedness in a similar manner. A corporation has been formed by the bondholders, to which the government has ceded immense areas of the richest public lands, together with control of the railroad to the capital, which, according to the terms of the contract, is to be completed by the corporation. The amount of indebtedness which the government wipes out in this manner is \$28,027,000, a large part of which was nominally bearing 10 per cent. interest.

Advices from Honda, Colombia, state that severe floods in that region have swept away bridges on the Dorado and Girardot railroads. The interior of Colombia has suffered considerably during the past seasons both from excessive rains and from devastation by locusts.

English journals have recently been quoting some remarks of Chas. R. Flint intended to show the present dependence of America upon British banks to effect clearances in our South American trade. The fact is indisputable, and should stimulate our people to alter it. Our facilities are deplorably inadequate for the increase of Southern trade, in many cases the freight rates from New York to Caribbean ports being exactly twice as great as from Liverpool to the same points.

A board of railroad statistics has been created by a decree of the Argentine Minister of the Interior, the object being to obtain data on the basis of which railroad legislation may be intelligently guided.

An amalgamation of the Central Argentine and the Buenos Ayres & Rosario railways is being seriously considered. The former extends from Rosario to Cordoba, with several branches in the state of that name, practically paralleled by the main line and branches of the latter. It is estimated that the receipts of these two roads would be increased \$500,000 per annum by such a combination. The Central Argentine has probably the most to gain by this transaction, since it has suffered not alone by the competition of the Buenos Ayres & Rosario Railway but by the loss of traffic from Cordoba since the completion of the narrow gauge Rosario & Cordoba Railway, which has amal-

gamated with the Central Northern Railway, affording a continuous route of one gauge from near the Bolivian frontier to the port of Rosario.

Difference of gauge on connecting railroads is becoming a serious trouble in Argentine, and, strange to say, no greater wisdom appears to rule in projects for the future. It may not be generally known that the transcontinental line from Buenos Ayres to Valparaiso, now nearing completion, will be afflicted with this same evil, having a 5 ft. 6 in. gauge to Mendoza, on the Argentine side, and a 4 ft. 8½ in. gauge to Santa Rosa, on the Chilean side.

The Tres Arroyos-Bahia Blanca branch of the Buenos Ayres Great Southern Railway, 120 miles in length, was opened to traffic last month. Work was begun in November, 1888, and a force of 2,500 laborers has been employed in construction. The cuts on the line amounted to 2,340,000 cu. yds., and two viaducts and 32 bridges had to be built. The track was laid with 70-lb. rails. The cost of this road was \$4,607,875, or about \$38,400 a mile.

The gross receipts of the Antofagasta & Bolivia Railway for the year just ended were \$2,840,000, an increase of nearly 16 per cent. over those of 1890, in spite of the Chilean revolution. There are at present 379 miles on this route open to traffic.

The Alagoas Railway Co., of Brazil, opened its new branch to Assemblies on Dec. 24, 1891. The concession for this branch, 40 miles in length, was granted in 1885. The actual work of construction occupied 28 months, less than was required by the contract with the Government. The main line of the Alagoas Railway extends from Maceió, the capital of the state of Alagoas, northwest along the valley of the Rio Mundau to the town of Imperatriz, a distance of 55 miles.

It is announced that Messrs. G. Amsinck & Co., of New York, have extended their banking facilities in Colombia, so that drafts upon New York may now be purchased in all the important towns of that republic. These conveniences should facilitate our trade considerably with Colombia.

James Orr, Chief Engineer of the Cauca Railway, an American enterprise intended to connect Buenaventura, Colombia, with Cali and the Valley of the Rio Cauca, was drowned a few days ago in the floods on the Rio Chantadura.

Traffic in the Fourth Avenue Tunnel.

General Manager Platt of the "Harlem line," which includes that portion of the New York Central & Hudson River road from Forty-second street to 149th street, New York City, has just made his annual report. The average number of trains per day last year (including Sundays) was 411. The greatest number of trains in any one day was 532, and they included 2,312 cars. The increase in the number of each day over 1890 was 59. An average of 65 trains in each direction stop at Mott Haven (138th street) Station daily, and, in the language of the report, "these stops with the drawbridge openings close the line three hours a day." Changes of track are in progress at Forty-ninth street, which will afford easier access to the west yard and increase the switching facilities now overcrowded at that point. New signals for the tunnel, retaining the safeguards of the track circuit and the absolute block, at the same time overcoming the delays inseparable from them, have been devised, officially approved by the Railroad Commissioners, contracted for, and are now under construction. The drawbridge over the Harlem River was opened 11,428 times last year, an average of about 31 times each day.

The National Board of Trade.

The National Board of Trade held its twenty-second annual meeting in Washington this week. The subjects considered were: The question of permanence in the statistical work of the Government, uniformity of commercial laws, improvement of public highways, the Torrey Bankruptcy Bill, amendments to the Interstate Commerce Act, uniform bills of lading, rolling stock used for storage purposes, extension of trade relations, regulation of immigration, improvements of the Great Lakes and the Mississippi River, the enlargement and maintenance of the Erie Canal by the general government, silver legislation, National banking laws, an anti-adulteration law, insurance, letter postage, cheap telegraphy, a permanent census office and the Presidential term.

The Canals of New York.

Superintendent Hannon, of the State Department of Public Works, in his annual report for the fiscal year ending Sept. 30, 1891, emphasizes State Engineer Boagart's observations concerning the dangerous condition of the aqueducts on the Erie Canal, stating that the only obstruction to navigation during the year have been through their partial failures. The expense of operating the State system of canals, with ordinary repairs, has been \$747,079.43. Much of the work covered by special appropriations is computed, and the remainder is progressing as fast as practicable. A further appropriation of \$15,000 for the completion of the Forrest Port dam is called for.

The whole number of tons of freight carried upon the canals of the state during the season of navigation was 4,503,472, and was composed of the following described class of articles: Products of the forests, 1,200,980; agriculture, 1,171,192; manufactures, 109,387; merchandise, 250,083; other articles, 1,825,824. Of the total amount of freight moved, 3,190,331 tons were carried east and 1,373,141 tons were carried west; and of this amount 2,651,838 tons were through freight and 1,911,634 tons were way freight. Comparing the tonnage of 1891 with that of 1890, there is shown to be a loss of 682,630 tons, but during the year 1890 much ice was transported upon the canal, so that the loss last year, as compared with the tonnage of last year (exclusive of the ice), is 215,003 tons.

Mr. Hannon says that the present system of lengthening locks is insufficient as a mode of increasing the usefulness of the canals, and that future improvements should be made with a view to enabling boats with much larger cargoes to be navigated upon them, and with a further view to a more rapid delivery of cargoes between the points of production and consumption, which also involves an increase in the motive power for the propulsion of boats over that which is now used upon the canals.

The only profits made by carriers on the canals has been made by those of them that operated steam canal-boats. Of these 60 were employed last season.

Two Passenger Classes Instead of Three.

The managers of the Cheshire and the Manchester, Sheffield & Lincolnshire Joint Railroad System, from Manchester, Eng., to Hawarden, and to Wrexham via Chester, in accordance with notice, have discontinued

the issue of second class tickets. The order came into force Jan. 1, when the carriages used for the second class were utilized for the better accommodation of third class passengers. Persons who may hold unexpired second class season or contract tickets will be allowed to occupy first class carriages. No reduction has been made in the fares at present for first class tickets.

Securities listed at the New York Stock Exchange.

The Governing Committee of the New York Stock Exchange has added to the lists for dealings new securities, as follows:

Chicago, Peoria & St. Louis.—\$1,041,000 first consolidated mortgage five per cent gold bonds of 1892.

Louisville, New Albany & Chicago.—\$3,200,000 additional capital stock, making the total amount listed \$9,600,000.

Louisville & Nashville.—\$500,000 additional unified 50-year four per cent. gold coupon and registered bonds, making the total amount listed \$7,750,000.

Milwaukee, Lake Shore & Western.—\$375,000 additional extension and improvement five per cent. gold sinking fund bonds, making the total amount listed \$4,104,000.

Northern Pacific Terminal Co. of Oregon.—\$800,000 additional first mortgage six per cent. gold bonds, making the total amount listed \$3,600,000.

Norfolk & Western.—\$7,050,000 Maryland and Washington division first five per cent. gold bonds.

Home, Watertown & Ogdensburg.—\$300,000 additional capital stock, making the total amount listed \$7,988,100.

Savannah, Americus & Montgomery.—\$2,920,000 first mortgage six per cent. 30-year gold bonds of 1892.

West Virginia Central & Pittsburgh.—\$300,000 additional first mortgage six per cent. gold bonds, making the total amount listed \$2,800,000.

Wheeling & Lake Erie.—\$1,000,000 additional common capital stock, making the total amount listed \$6,000,000.

Maine Railroad Commissioners' Report.

A summary of the 3d annual report of the Railroad Commissioners of Maine has been published. By an amendment of the law the returns of corporations close June 30, instead of Sept. 30, as heretofore. The total length of steam railroads June 30, 1891, is 1,382.47 miles. The gross transportation earnings for the year were \$7,012,778. Total number of passengers carried, 5,502,646. Tons of freight carried, 10,380,420. The annual examinations showed a continued improvement in roads, rolling stock, bridges and buildings, and certificates giving the condition of all railroads were sent to each corporation as required by law.

The Board has granted approval of certain heaters for cars, but has notified all roads that after June 30 next no method of heating will be approved which does not reduce the danger by fire to a minimum.

"During the past session of the Legislature, but little legislation respecting railroads was enacted. The spirit of animosity to railroad corporations and their management which prevails among the people of the South and West, and which has culminated in the enactment of the Interstate Commerce Law, and much adverse legislation in several states, has not, to much extent, prevailed in Maine."

Several attempts to secure legislation, controlling rates and traffic, were made, "none of which, however, have received favorable consideration by the law-making power." Since the enactment of the law in 1876, giving the Commissioners power to revise and establish rates, "we are pleased to state that the railroads have been operated in such manner that no complaint has yet been made to this Board that tolls or charges were unreasonable high."

"From the commencement of the agitation, which culminated in the enactment of the Interstate Commerce Law, we have believed that all attempts by the National Government or individual states, to regulate and control the passenger and freight traffic on railroads, through or by commissions, was unwise, and that the results of such legislation would be detrimental to the true interests of the people. That the enactment of some of the provisions of that law, has not resulted more disastrously to the commercial interests of the country is, we believe, to be attributed to failure or inability to enforce the same, by the Interstate Commerce Commission."

The new Portland & Rumford Falls road, an extension from Canton to Rumford Falls, about 18 miles, is nearly completed. The surveys of the Bangor & Aroostook from Brownsville to Presque Isle and Caribou are completed, and \$900,000 subscriptions to preferred stock have been received. Only \$100,000 more is needed.

The Commissioners command the Maine Central for keeping cars and station buildings in a neat and clean condition. They renew their former recommendation of a system of grading in each department, and promotions, based upon careful examinations, as a method to secure competency and faithfulness on the part of employees.

Only one passenger of the 5,502,646 carried by steam railroads was killed (and that by his own carelessness), and five injured. The total number accidents in Maine on steam railroads was as follows: Employees killed, 9; injured, 12; passengers, 1 killed and 5 injured; trespassers, 9 killed and 4 injured; others, 4 killed and 1 injured; total, 23 killed and 22 injured.

LOCOMOTIVE BUILDING.

A large locomotive has been built at the Portland, (Me.) Locomotive Works for the Western Counties railroad of Nova Scotia.

The Chicago, St. Paul & Kansas City is remodeling, at the South Park shops, six 17 x 24 locomotives into six-wheel switching engines.

CAR BUILDING.

The Harbor Commissioners of Montreal invite tenders for 50 small cars, 300 boxes for dredging, 60 tons of light rails and a pile-driving engine.

The Pullman Palace Car Co. has recently received orders to build 22 passenger cars for the Southern Pacific and 25 passenger cars for the Central of New Jersey. An order has recently been let by the Chicago, Rock Island & Pacific for a large number of passenger cars.

The Norfolk & Western let contracts last week to the Pullman Palace Car Co. for 1,000 box and 400 coal cars, and also for 25 passenger, 10 baggage, 10 mail and five parlor cars. The freight cars are to be delivered in April, May and June and the passenger equipment in the three following months.

A contract has been let to the Pullman Palace Car Co. for 20 coaches for the Chicago, St. Paul, Minneapolis & Omaha, and for 100 for the Chicago & Northwestern. These are to be delivered at the rate of 20 a month, be-

ginning August, 1892, and the Pullman Company has the option of delivering them more rapidly after Sept. 1, 1892.

The Barney & Smith Mfg. Co. will soon have ready for delivery the 16 vestibule passenger and sleeping cars being built for the Canadian Pacific. Besides these, eight cars are being built in the company's shops at Montreal. The road is also having built six solid vestibuled trains to be run between Montreal and St. Paul by way of Sault Ste. Marie. Twelve of the new sleeping cars are to be placed on the route between Montreal, London, Detroit and Chicago next spring.

BRIDGE BUILDING.

Black River, Mich.—The Flint & Pere Marquette Railway Co. will tear down the iron bridge across Black River, and build a new one in its place. The new structure will be several feet wider than the present one and 40 ft. longer. It is proposed to build a new and heavier foundation for the new bridge.

Hallettsville, Tex.—John Buchanan will receive bids until Feb. 8 for constructing an iron bridge on Smothers' Creek, in Lavaca County.

Philadelphia.—An ordinance has passed the Philadelphia Councils to enter into contracts with the Pennsylvania, and the Philadelphia & Reading, for the construction of bridges to carry Ontario street, Glenwood and Sedgely avenues and such other streets and avenues as may be required by the Director of Public Works over or under said railroads. The railroad companies are to pay not less than \$100,000 for the work and \$200,000 is to cover the expense to the city.

Sioux City, Ia.—The preliminary survey is being made for a high bridge over the Missouri River for the purpose of determining the location to guide the framers of a bill for a charter which will be introduced in Congress.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is laid down that the Missouri statute, which prohibits any railroad company within the state from owning, operating or managing any other parallel or competing railroad within the state, applies only where both the roads are situated within the state and the competition between the two must be of some practical importance, such as is liable to have an appreciable effect on rates. Two railroads which do not touch at any two common points, and between which for a distance of 40 miles another railroad is interposed, and whose traffic, except an unimportant amount, would in no event pass over the other, are not competing lines within the meaning of the statute.¹

Pursuant to state authority, recognized by and made a part of the congressional grant of March 3, 1871, the Southern Pacific Railroad Co., April 15, 1871, filed amended articles of incorporation; and Aug. 12, 1873, filed, together with the S. P. Branch R. Co., articles of amalgamation and consolidation, under the name of the Southern Pacific Railroad Co. It is held in the Federal Court that while in one sense a new corporation was formed, each was substantially and practically the same S. P. R. R. Co. mentioned in the acts of Congress, and was so recognized by Congress, and that the articles of amendment, amalgamation and consolidation were authorized by congressional as well as by state legislation.

In North Dakota a deed of land by a railroad company reserved and excepted a strip 400 ft. in width, 200 ft. on each side of the centre line of the road, or any of its branches, for a right of way. Subsequently a separate corporation constructed a line of railroad across the granted land, and then leased the same to the grantor railroad company, which latter company operated the same as a branch of its main line. The Supreme Court rules that whatever interest in the right of way the latter company had, it obtained and held under its lease, and not under the reservation, since that could not operate in favor of a stranger to the deed.²

Injuries to Passengers, Employers and Strangers.

In Florida, the Supreme Court rules that an engineer, fireman, brakeman and shovelers on a gravel train, engaged in loading, hauling, and unloading gravel in repair of the road bed are fellow servants, and in the absence of a statute imposing such liability, the railroad company is not liable to one of the shovelers for personal injury received in consequence of the negligence of the engineer in putting the handling of his engine in the hands of his fireman.³

In Maine it is held that an engineer and a conductor of a railroad company are fellow servants, and the former cannot recover from the company for injuries caused by the latter's negligence.⁴

In Texas the Supreme Court rules that the fact that at the time of a collision the train on which deceased was working was being moved backwards does not imply an unusual risk not assumed by him, where, ever since his employment thereon a month before, the train has been daily moved in that manner.⁵

In North Dakota it is held by the Supreme Court that an employé of a railroad, riding by right on the platform of a caboose, does not assume the risk arising from the maintenance of a switch stand of such height and in such position that the target will sometimes come in contact with the sides of passing cars, particularly when he knows that the rules of the company prohibit the erection of any such switch stand within less than 6 ft. of the track.⁶

The Supreme Court of Georgia rules that though attempting to couple cars when the engine is running at a speed of 15 miles an hour is apparently not only dangerous but reckless, if it be true in the experience of engineers and railroad men that it is safe, provided the engine is properly managed, and if the failure in question resulted solely from the fault of the engineer in manipulating the engine, the high speed will be no obstacle to a recovery by the car coupler for personal injury sustained by him in making the attempt.⁷

The Supreme Court of Maine rules that a railroad is not liable to an employé for an injury happening to him in executing an errand of danger, upon which he is sent by the superintendent, unless the superintendent be guilty of negligence in ordering the dangerous act to be performed.⁸

In North Dakota a switchman in defendant's employ was injured while coupling an engine to a car because there was not sufficient space for his body between them. The drawbars of the engine and of the car were unusually short, leaving a space of only about 10. in. between the end of the car and of the engine when the drawbars came together, whereas the usual space is from 24 to 30 in. The engine was moving slowly, giving plaintiff ample time to have discovered the defect. The

Supreme Court rules that, in view of the fact that the defect was patent, and that the rules of the company required its employés to exercise great care in examining coupling apparatus, and gave them sufficient time to make the examination, plaintiff could not recover.¹⁰

In Michigan the Supreme Court rules that evidence that railroad employés operating a freight train, shunted three cars without anyone theron past a crossing, without any signal or warning, and that they knew the driver of a team was approaching such crossing, is sufficient to support a finding of gross negligence on the part of the railroad.¹¹

In Georgia in an action against a railroad by its engineer for personal injuries sustained in running his train into a washout, it appeared that the culvert at which the washout occurred had withstood storms for 30 years, and that there was no reason for suspecting it of weakness; that shortly before the washout, which was from 30 minutes to 2½ hours before the accident, the section-man examined the culvert, and, it appearing perfectly safe, went four miles up the track, where he apprehended danger, and watched. While there a severe and unprecedented water spout, which he had no reason to apprehend, and of which he did not know until after the accident, occurred at the culvert, causing the washout. The Supreme Court holds the railroad not liable.¹²

- ¹ Kimball v. A. T. & S. F. R. Co., 46 Fed. Rep. 888.
- ² United States v. Southern Pac. R. Co., 46 Fed. Rep. 883.
- ³ Dunstan v. Nor. Pac. R. Co., 49 N. W. Rep. 421.
- ⁴ Parrish v. P. & A. R. Co., 9 South Rep. 696.
- ⁵ Lasky v. C. P. Ry. Co., 22 Atl. Rep. 367.
- ⁶ G. & S. & S. A. Co. v. Arispe, 17 S. W. Rep. 47.
- ⁷ Boss v. North. Pac. R. Co., 49 N. W. Rep. 635.
- ⁸ Robb v. E. T. V. & G. R. Co., 13 S. E. Rep. 366.
- ⁹ Lasky v. C. P. Ry. Co., 22 Atl. Rep. 367.
- ¹⁰ Bennett v. Nor. Pac. R. Co., 49 N. W. Rep. 408.
- ¹¹ Schindler v. M. L. S. & W. Ry. Co., 49 N. W. Rep. 670.
- ¹² Cent. R. & B. Co. v. Kent, 13 S. E. Rep. 302.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Buffalo, Rochester & Pittsburgh, quarterly, 1½ per cent. on the preferred stock, payable Feb. 15.

Cincinnati, Hamilton & Dayton, 1¼ per cent., payable Jan. 30.

Illinois Central, semi-annual, 2½ per cent. in cash, payable March 1.

North Carolina, semi-annual, 3 per cent., payable March 1.

Rome, Watertown & Ogdensburg, 1½ per cent., payable Feb. 15.

Sandusky, Mansfield & Newark, annual, 3½ per cent., payable Feb. 1.

Toledo & Ohio Central, quarterly, 1 per cent., payable Feb. 25.

West Virginia Central & Pittsburgh, 1 per cent., payable March 1.

Wheeling & Lake Erie, quarterly, 1½ per cent., payable Feb. 16.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Allegheny & Kinzua, annual, Olean, N. Y., Feb. 9.

Barclay, annual, 204 Walnut street, Philadelphia, Pa., Feb. 8.

Brooklyn Elevated, annual, adjourned, 31 Sands street, Brooklyn, N. Y., Feb. 20.

Camden & Atlantic, annual, Cooper Point, Camden N. J., Feb. 25.

Chippewa Valley, annual, Mount Pleasant, Mich., Feb. 17.

Delaware, Lackawanna & Western, annual, 22 William street, New York City, Feb. 23.

Guelph Junction, annual, Guelph, Ont., Feb. 2.

Huntington & Broad Top Mountain Railroad & Coal Co., annual, American Life Building, Philadelphia, Pa., Feb. 2.

Kansas City, Memphis & Birmingham, annual, Memphis, Tenn., Feb. 3.

Kansas City, Wyandotte & Northwestern, annual, Kansas City, Mo., Feb. 3.

Keokuk & Western, annual, Keokuk, Ia., Feb. 3.

Kingston & Pembroke, annual, Kingston, Ont., Feb. 8.

Mobile & Ohio, annual, 11 Pine street, New York City, Feb. 4.

Northern Central, annual, Baltimore, Md., Feb. 25.

Philadelphia & Erie, annual, Philadelphia, Pa., Feb. 8.

Scioto Valley & New England, annual, Columbus, O., Feb. 11.

Southwestern (Georgia), annual, Third street, Macon, Ga., Feb. 11.

Summit Branch, annual, 233 South Fourth street, Philadelphia, Pa., Feb. 9.

Wheeling & Lake Erie, annual, Toledo, O., Feb. 2.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Railway Freight Claim Association of the Eastern, Western and Southern States will hold its regular semi-annual meeting at the Grand Pacific Hotel, Chicago, Ill., March 3.

The New England Railroad Club holds regular meetings, at the United State Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month commencing January.

The Western Railway Club holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The Southern Railway Club holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The Northwest Railroad Club meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The Northwestern Truck and Bridge Association meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The Engineers' Club of St. Louis holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The Engineers' Club of Philadelphia holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The Engineers' Club of Cincinnati holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The Civil Engineers' Club of Cleveland holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers and Architects holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The Civil Engineers' Association of Kansas holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The American Society of Swedish Engineers holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The Engineers' Club of Minneapolis meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The Canadian Society of Civil Engineers holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The Association of Civil Engineers of Dallas meets at 808 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The Technical Society of the Pacific Coast holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The Tacoma Society of Civil Engineers and Architects holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

Association of Engineers of Virginia.

The first annual session of the Association of Engineers of Virginia convened in Roanoke, Va., last week. President Wingate was in the chair, and announced that the following officers had been elected: President, Clarence Coleman; Vice-President, J. H. Wingate; Directors, M. E. Yeatman, J. E. M. Humphreys, W. E. Andrews and C. G. Cushman; Secretary and Treasurer, J. H. Shick. A number of papers on engineering subjects were read.

Canadian Society of Civil Engineers.

The Canadian Society of Civil Engineers held its annual meeting in Montreal last week. The annual report showed that the income for the year amounted to \$4,468, and the general expenditure reached \$3,254. The total number of members includes 60 honorary members, 222 members, and 115 associate members, 70 associates, and 177 students, or 659 in all. The Building Committee reported a lack of interest by the members in the building fund. During the year only \$180 has been received, making a total to the credit of the fund \$3,114, and leaving uncollected subscriptions to the amount of \$402. An invitation from the American Engineers' Association, asking the Canadian Society to co-operate in entertaining visiting foreign engineers at the Chicago World's Fair was the subject of considerable discussion. The answer was left in the hands of the council, it being understood that the meeting was adverse to its acceptance. The election of officers resulted as follows: President, John Kennedy, Montreal; Vice-Presidents, P. A. Peterson, Montreal; W. T. Jennings, Toronto; Thomas Munro, Coteau; Treasurer, Herbert Wallis, Montreal; Secretary, Clement H. McLeod, Montreal; Librarian, William McNab, Montreal; members of the council, H. T. Bovey, P. W. St. George, K. W. Blackwell, Montreal; J. Hobson, Hamilton; H. G. C. Ketchum, Fredericton, N. B.; H. K. Ruttan, Winnipeg; C. E. W. Dowell, Halifax, N. S.; H. J. Cambie, Vancouver, B. C.; C. H. Keefer, H. D. Lumsden, A. MacDougal, Toronto; F. S. Grisbrom, Ottawa; J. D. Barnet, Stafford; F. C. Gamble, Victoria, B. C.; E. A. Hoare, Quebec. Mr. T. C. Keefer moved that the society recommend to the Government of Canada that no more locks be constructed on the St. Lawrence Canal with the length of the chamber established by the Canal Commission in 1871, but that this length should be increased to meet the requirements or the proportion of length to beam in modern naval architecture as established without reference to locks upon the upper lakes and upon the ocean. The discussion was deferred.

Engineering Association of the South.

The regular January meeting was held at the association headquarters, Nashville, Tenn., Jan. 14, Lieut. John Biddle, Corps of Engineers, U. S. A., presiding. The tellers reported the election of Mr. William Hewitt, Engineer and Vice-President of the Trenton Iron Co., Trenton, N. J., and Mr. John S. Walker, U. S. Assistant Engineer, Nashville, Tenn., as members; also Mr. C. F. Nebus, draftsman, Nashville, Tenn., and Mr. William H. Shorley, Assistant Engineer W. & A. P. R. R., Atlanta, Ga., as Juniors. The committee, composed of Messrs. Landreth, Kirkpatrick and Fairleigh, appointed at the last meeting to consider the feasibility of holding in the spring of 1892 under the auspices of the association a competitive trial of machinery used in highway construction, reported that they had received favorable

replies from a large number of manufacturers agreeing to take part in the contest. The committee was continued, and directed to submit to the membership a general plan for carrying out the contest.

Mr. W. G. Kirkpatrick then presented a paper on "The Engineering Features of the Cumberland Race Track." This is a regulation track recently built in Nashville under the direction of the writer as engineer. The paper gave a full comparison of the relative advantages and disadvantages of the "kite shaped track" and the "regulation track," the latter of which was finally adopted on account of the difficulty of fitting the "kite shaped track" to the topography of the ground without excessive earthwork.

Engineers' Club of Philadelphia.

The annual meeting was held at the rooms of the club in Philadelphia, Jan. 16, President Wilford Lewis presiding, and about 63 members and six visitors being present. The president in his annual address spoke of the notable growth in the prosperity of the club during the year. He reviewed the progress of the engineering profession in the last year, and referred at length to the rapid consumption of the stores of natural fuel, and held that these are nearer exhausted than is popularly supposed. He referred to the railroad construction of the year, the progress in the use of compound locomotives, and spoke against some of the claims made for cable traction for street railroads in large cities. He also spoke briefly of the World's Fair at Chicago, and of the progress in the manufacture of American ordnance and of the new ships for the navy.

The board of directors reported a very marked increase in the attendance at the meetings. This increase has amounted to nearly 100 per cent. since the policy of issuing advance copies or abstracts of papers was adopted. Forty-seven active and 3 associate members were admitted, and the resignations of 24 active and 3 associate members were presented and accepted during the year. The total number of members of all classes at the end of the year was 421. Over \$300 had been subscribed to the fund for establishing an engineering headquarters and engineering congress at the World's Fair in Chicago in 1893. The tellers of election reported that 23 active members and one associate member had been elected, and that the officers elected for the coming year are: President, James Christie; Vice-Presidents, Frederick H. Lewis and Pedro G. Salom; Secretary, John C. Trautwine, Jr.; Treasurer, T. Carpenter Smith; Directors, John E. Codman, George V. Cresson, Strickland L. Kneass, Wilfred Lewis, H. W. Spangler, David Townsend.

The charter of the club was accepted and ratified. An amendment to the by-laws, presented at the last meeting, and providing for the appointing of a nominating committee to filling such vacancies as may occur in the ticket. The President was directed to appoint a committee to revise the constitution and by-laws, when, in the opinion of the Board of Directors, such appointment becomes necessary.

Mr. Carl Hering moved the appointment of a committee to confer with the other engineering and technical societies of Philadelphia with regard to a plan for cooperation among these societies for the purpose of erecting a large building for their joint use.

Mr. Rudolph Hering moved that the Committee on Landlocked Navigation appoint a sub-committee to cooperate with similar committees of the Philadelphia Trades League and the New York Board of Trade and Transportation to further the project for a ship canal across the state of New Jersey. Both these motions were deferred until the next business meeting.

Engineers' Club of St. Louis.

At the meeting on Jan. 20, at 8 p. m., President Johnson in the chair, 37 members and three visitors were present. J. P. Seddon was elected a member and J. W. Woerman was proposed for membership.

Mr. Edward Flad read a paper on "An Inclined Cable Railway for Transferring Freight Cars Between the Upper and Lower Yards of the Western Cable Railway Company." He described the construction and operation of a cable road built to transfer freight cars between railroad tracks and a warehouse in St. Louis. The grade of Potomac street, along which the road is built, is such that it is impracticable to operate with a locomotive, hence the cable system was adopted. Two loaded freight cars are transferred at each trip over a maximum grade of 7.2 ft. per 100 ft.

This is the first road of the kind that has ever been constructed and hence it is of special interest. A number of novel features are introduced. There is a safety stop device, by means of which train weighing 180,000 lbs., moving down grade at the rate of five feet a second, can be stopped within a distance of five feet without serious shock, a hydraulic cushion being provided to take up the energy of the moving loads. Electric signals are transmitted between the train and hoisting engine through an electric wire placed in the core of the steel cable. The paper was illustrated by blue prints giving full details of construction. Discussion followed by Messrs. Farham, Gayler and Seddon.

Mr. Whithfield Farnham then read the second paper of the evening and gave a full account of the recent disastrous colliery explosion at McAlister, I. T., in mine 11 of the Osage Coal & Mining Co. The mine is well equipped, having duplicate pumps, steam and electric, duplicate fans situated at considerable distance from hoisting shaft; an electric plant for pumping and lighting, with the engines and boilers, housed in suitable stone buildings. Two separate openings or escapement shafts besides the air shaft are provided, and are in daily use. The main shaft is 475 ft. deep. The explosion was started at 5:04 p. m., by a blow out or "windy" shot or blast fired contrary to rules before the miners had been hoisted out of the mine. Gas or fire damp was not a factor in the explosion, and powder played no part except as fired in the fatal shot in blasting down the coal. Coal dust seems the only remaining medium capable of carrying the explosion over the 2,000 ft. or more of entries which were affected by the accident. The work of rescue was prompt and effective, but 37 men were brought up dead, and 20 more died in the 12 days following, while about 120 more were more or less injured, principally by burns. Discussions followed by Messrs. Wheeler, Ferguson, Seddon, Potter, Hermann, Crosby, Johnson and Holman.

The Civil Engineers' Club of Cleveland.

A regular meeting was held at the club rooms on Jan. 12, with President Gobelle in the chair and 46 members and visitors present. Mr. Charles W. Hopkinson was elected an active member. A committee was appointed to nominate candidates for offices for the ensuing year. Prof. John N. Stockwell read an interesting paper entitled: "On the Centre of All the Dry Land on the Earth's Surface."

The Illinois Society of Engineers and Surveyors.

The seventh annual meeting of the society is being held at the Grand Pacific Hotel, Chicago, this week, the sessions extending over Jan. 27, 28 and 29. The meeting began with an afternoon session on Wednesday at 3:30 o'clock, the regular sessions being at 9:30 a. m., 3:30 p. m. and 7:30 p. m. The following papers have been promised: "Proper Construction of Brick Culverts on the Public Highways," by G. W. Gastman, of Hudson, Ill.; "Field Measurements for the Granite Viaduct at Granite, Idaho," by E. I. Cantine, of Mullan, Idaho; "Qualities of Water for Domestic Supply and Boiler Use," by D. W. Meade, of Rockford; "State Inspection of Bridges," by E. A. Hill; "Method of Laying the Kite-Shaped Race Track," D. H. Davison, of Milwaukee; "Roadways," by F. S. Balcom, of Mt. Carmel, Ill., and on other subjects. Reports have been prepared by the committees on land and city surveying, roadways, legislation, mining engineering and on instruments and records. A number of topical questions have been announced for discussion at each of the sessions. The afternoon session on Thursday will be intermitted and a visit made to the Jackson Park to view the progress of the work on the buildings for the World's Fair.

PERSONAL.

Prof. Palmer C. Ricketts, Mem. Am. Soc. C. E., has been elected Director of the Rensselaer Polytechnic Institute of Troy, N. Y.

Mr. Thomas Muir, late Manager of the Ontario Car Shops at London, has been appointed Treasurer of the Detroit Electrical Works.

Mr. Joseph T. Penton, Auditor of the Louisville, New Orleans & Texas, died at Memphis, Tenn., Jan. 22. He was 31 years old and had been Auditor of the road since 1885.

Mr. Frank W. Stewart, formerly Purchasing Agent of the Ohio Central Railroad, has made an engagement as traveling salesman for the Kalamazoo Railroad Ve locipede Co., of Kalamazoo, Mich.

Mr. W. W. Currier, who was for eight years, and until recently, Superintendent of Transportation of the Rome, Watertown & Ogdensburg, has taken service with the Montana Central, with headquarters at Helena, Mont.

Mr. Elijah W. Morgan, who was the first President of the Toledo & Ann Arbor Railroad, and very well known in Michigan, died at Ann Arbor, Mich., on Jan. 20. He was born in 1805, and became interested in railroads through his business as a banker.

Mr. J. F. Tucker, who was connected with the Chicago, Milwaukee & St. Paul, for a number of years as Assistant General Manager and as Assistant to the President, has been recently elected Vice-President and General Manager of the Chicago, Fort Madison & Des Moines.

Mr. George L. Carey, who died in Brooklyn, Jan. 23, was General Freight Agent of the New York, Lake Erie & Western under the Fisk-Gould management. About ten years ago he was Assistant General Freight Agent of the Old Dominion Steamship Co., but he has not been in active business for some time.

Mr. I. D. Barton has resigned the General Superintendency of the Long Island Railroad to become General Superintendent of the New York & New England, and not General Manager, as reported last week. He succeeds Mr. D. H. Nichols, formerly General Superintendent of the St. Louis & San Francisco, who is to return to the West.

Mr. C. W. Chears has accepted the position of Assistant General Freight Agent of the Kansas City, Memphis & Birmingham Railroad, to which he was appointed a short time ago, and will assume charge, with headquarters at Memphis, on Feb. 1. Mr. Chears is at present General Manager of the Columbus Southern Railroad, which position he will resign.

Mr. Samuel Goodman, Assistant General Freight Agent of the New York Central & Hudson River road, has been appointed General Freight Agent of the Rome, Watertown & Ogdensburg, in addition to his present duties. Mr. H. A. Hodge, the present General Freight Agent, has been appointed Assistant General Freight Agent. The office of General Traffic Manager has been abolished.

The directors of the Pittsburgh, Ft. Wayne & Chicago have elected Charles Lanier, of the banking house of Winslow, Lanier & Co., President, to fill the vacancy caused by the death of the late Mr. Louis H. Meyer, of New York. Mr. Lanier is, in point of service, one of the oldest directors of the company. In the directory he succeeded his father, the late Mr. J. F. D. Lanier, who was one of the original directors of the road.

Mr. L. A. Emerson, recently Traffic Manager of the Rome, Watertown & Ogdensburg, has been appointed General Traffic Manager of the Central Vermont road. Mr. Emerson had been in charge of the Traffic Department of the Rome, Watertown & Ogdensburg for the last four years. He had been connected with the Missouri Pacific for the previous 10 years and was General Freight Agent of that road between 1884 and 1886.

Mr. W. G. Richards has resigned his position as Superintendent of the works of the American Steel Wheel Co., at South Boston, Mass. Mr. Richards has had long experience in wheel making, including early service in the manufacture of the Allen paper wheel while the works were at Hudson, N. Y. In his last position he has done important service in inventing and perfecting the processes of making the solid cast steel wheels which are now extensively used. This process was described in the *Railroad Gazette*, June 5, 1891.

Mr. George Codwise Dickinson died this week at his estate in Virginia, near Cobham, Albemarle County. He was 60 years of age, and was born in New York City. He was educated for the profession of mining and railroad engineering, which he subsequently followed. In early manhood he moved to Virginia, where he has since lived. At the outbreak of the war, he entered the Confederate service as a captain of engineers, and served throughout the war in the Army of Virginia. He has been Chief Engineer of several Southern railroads.

Mr. Lawrence Myers died at Plainfield, N. J., last week, aged 58 years. Mr. Myers has not been engaged in business for a number of years, but during the civil war he was a member of the firm of P. M. Myers & Co., which performed valuable service for the United States Government as financial agents. Mr. Myers was largely

interested in financing railroads, and was interested, among others, in the Southern Minnesota and the Richmond & Allegheny Railroad. He was appointed a receiver for the latter road, and at the conclusion of that service practically retired from business affairs.

—Mr. B. W. McCullough, General Passenger and Ticket Agent of the Texas & Pacific, died at Hot Springs, Ark., Jan. 20. Mr. McCullough was one of the best known of the Texas railroad traffic men, and had resided in the state since 1877. He was born at Sidney, O., and was about 50 years old. After the civil war he became chief clerk of the passenger department of the Grand Rapids & Indiana road, but left that position to accept a similar one on the International & Great Northern. Mr. McCullough later became General Agent of the International & Great Northern, and when it became part of the Missouri Pacific he was appointed General Passenger and Ticket Agent of that road for the district south of Texarkana. When the Missouri, Kansas & Texas and the International Great Northern were separated from the Missouri Pacific he resigned from those roads and continued as General Passenger and Ticket Agent of the Texas & Pacific.

—Mr. James T. Furber, Vice-President and General Manager of the Boston & Maine, died at his home at Lawrence, Jan. 27, of pneumonia, after a week's illness. Mr. Furber began his railroad career on the Boston & Maine, and, excepting a short time which he spent on the New York, Lake Erie & Western as Station Agent at Jersey City, he was connected with that road continuously. He was for many years station agent at Great Falls, N. H., and Lawrence, Mass., and later became General Freight Agent. In 1873 he was appointed General Superintendent of the Boston & Maine, and for the last 19 years has been practically the General Manager of the road. He was elected Vice-President last year. Mr. Furber was a strong-minded and honest railroad man, and managed the road with untiring energy and conscientiousness, as well as marked ability. During his administration the road has grown from a comparatively small line to a system of nearly 2,000 miles, largely by the lease of competing lines, so that the company has in most of its territory very little competition.

—Mr. A. G. Darwin died at his home in Glenridge, N. J., Jan. 21, at the age of 65. Death was caused by nervous prostration and heart trouble. Mr. Darwin was born at Millville, N. Y., and was a son of the late Rev. Alanson Darwin. His early railroad work was as Superintendent on western lines. In 1870 he came to New York and engaged in the real estate business. He was for six or seven years President of the Allan Paper Car Wheel Co. He was also President of the Strong Locomotive Co., the San Juan Mining Co., of Colorado, and Treasurer of the Union Construction Co., now building the Kickapoo Valley & Northern Railroad in Wisconsin. He was also a Director in the New York & Long Island Railway Co. (tunnel route), and the Manhattan Quilting Co. Mr. Darwin lived at Glenridge for 15 years, and built more than half the houses in the place. He was instrumental in the erection of the handsome railroad station, the club house and public hall. He was a member of the Montclair Club, and a governor of the Essex County Country Club, at Hutton Park. He leaves a widow and two grown children.

ELECTIONS AND APPOINTMENTS.

Arcadia, Gulf Coast & Lakeland.—The following is a revised list of the officers: Anthony Peters, President, Boston; Edward Kakas, Vice-President, Boston; William G. Dacey, Second Vice-President, 2 Wall street, New York City; Frederick C. Peters, Treasurer, Arcadia, Fla.; William B. Rand, Secretary, Boston, and John H. Powers, Chief Engineer, Arcadia, Fla.

Atchison, Topeka & Santa Fe.—H. C. Ives, assistant to the President, has accepted the superintendency of the Chicago and Kansas City Division of the road. He succeeds on Feb. 1 A. Turner, who will be transferred to the traffic department. Mr. Ives has been Division Superintendent on the Wisconsin Central and the Great Northern.

Atlantic & Pacific.—C. N. Sterry has been appointed General Attorney of this company, with headquarters at Albuquerque, New Mexico, in place of William C. Hazeline, deceased.

Bloomsburg & Sullivan.—At the annual election of the company, held at Bloomsburg, Pa., Jan. 12, F. M. Leader was re-elected General Manager, Auditor and Purchasing Agent.

Chesapeake, Shenandoah & Western.—The incorporators of this Virginia company are: J. Hotchkiss, H. M. Bell, M. Erskine Miller, R. H. Catlett and J. N. Stubbs, of Shenandoah, Va.

Chicago, St. Paul, Minneapolis & Omaha.—Lyman Sholes, heretofore General Agent at Omaha, has been appointed Division Freight Agent, with headquarters at the same city.

Coahuila & Durango.—The company has been incorporated by H. A. Pesley, George H. Parsons, James M. Bolton, R. H. Graham and John E. Lundstrom, of Colorado Springs, Colo., to build a railroad in Mexico and New Mexico.

Lake Shore & Michigan Southern.—The headquarters of J. R. Reniff, recently appointed Master Car Builder for the Toledo Division will be at Norwalk, O., instead of Toledo, as recently reported. He succeeds B. F. Rumberger, resigned.

Marion & Rye Valley.—The company has been organized with P. S. Swain, of New York, President; G. W. Richardson, of Marion, Va., Vice-President, and J. S. Aperson, Secretary.

Middle Georgia & Atlantic.—At a meeting at Savannah last week of the Seaboard Co., the construction company for this road, the following Directors were elected: William Garrard, J. P. Williams, I. G. Haas, William Kehoe, Edward Karow, H. T. Moore, B. H. Levy, Savannah; W. C. Clark, Covington, Ga.; W. B. Thomas, Atlanta, Ga., W. E. Baskette, Chattanooga, Tenn.; Charles Benner, New York; John Morrison, Ellabell, Ga.; H. S. Stephens, Philadelphia.

Missouri, Kansas & Texas.—Robert Walker has been appointed Superintendent of the car department, and John Boyle has been appointed Master Carbuilder, succeeding Mr. Walker.

Missouri Pacific.—Frederick Knowland has been appointed General Eastern Freight Agent of the system, with headquarters in New York City. He succeeds H.

C. Logan, deceased. Mr. Knowland once represented the Union Pacific in New York.

John McCormick Superintendent of the New Mexico division, has been recently transferred to the Colorado division.

New York & New England.—I. D. Barton has been appointed General Superintendent with headquarters at Boston. C. N. Woodward has been appointed Chief Train Dispatcher on the section between Boston and East Hartford, Conn.

Northern Pacific.—John Dorsey, Assistant Superintendent of the Rocky Mountain Division of the Northern Pacific Railway, has been recently promoted to Superintendent of the Yellowstone Division, and J. R. Boyd, formerly Chief Train Dispatcher, has been promoted to Mr. Dorsey's position.

Omaha, Kansas Central & Galveston.—At the annual meeting of this company recently held, the following officers were elected: President, S. O. Constant, New York City; Vice President, C. M. Rawlings, Lyons, Kan., and Secretary, V. Silo, New York City.

Paducah, Tennessee & Alabama.—W. J. Hills has been appointed Assistant Superintendent of the road, with headquarters at Paducah, Ky.

Piedmont & Cumberland.—R. C. Kerens was re-elected President, and Major E. W. S. Moore Secretary and Treasurer at the recent meeting.

Pittsburgh, Fort Wayne & Chicago.—Charles Lanier, of New York, has been elected President of the company, and John S. Kennedy, also of New York, has been elected a director, to fill a vacancy caused by the death of L. H. Meyer.

Pittsburgh & Lake Erie.—At the annual meeting of the company at Pittsburgh, Jan. 26, the following officers were elected: President, John Newell, Cleveland, O.; Directors, Cornelius Vanderbilt, William K. Vanderbilt, F. W. Vanderbilt, Hamilton McK. Twombly, E. D. Worcester, New York; M. W. Watson, Henry Rice, James L. Bennett, James M. Bailey, F. H. Reed, E. M. Schooner and D. L. Wilson, Pittsburgh.

Potomac River & Great Falls.—The incorporators are R. W. Moore, B. F. Mackall, S. R. Donohue, J. M. Love and D. S. Mackall, of Virginia, and Henry Wise Garnett and S. P. Ficklin, of the District of Columbia.

Prescott & Northwestern.—The following are the Directors of the reorganized company: Benjamin Whitaker, of Texarkana, Tex.; K. T. Powers, W. B. Walker, William G. Harrington, of Prescott, Ark., and William N. Bemis, of Jefferson, Tex. The officers are: Benjamin Whitaker, President; W. B. Walker, Vice-President; J. C. Young, Secretary, and John Delahoyde, Treasurer.

Richmond, Blackstone & Southern.—The following are the incorporators named in the Virginia charter: Freeman Epes, R. W. Tuggee, T. M. Dillard, James L. Anderson, Thomas R. Hardaway, J. M. Harris, H. Vaden of Virginia, and Frank P. Bennett, of Massachusetts.

Richmond & Danville.—P. J. McGovern, of Louisville, Ky., has been appointed Chief Clerk to the Traffic Manager of this road. Mr. McGovern lately resigned his position of Assistant General Freight Agent of the Louisville & Nashville.

Rome, Watertown & Ogdensburg.—Samuel Goodman, General Freight Agent of the New York Central, has been appointed General Freight Agent of the Rome, Watertown & Ogdensburg, with headquarters at New York. He remains Assistant General Agent of the Central. H. A. Hodge has been appointed Assistant General Freight Agent, with headquarters at Watertown.

Salem & Croig.—J. W. Marshall, A. E. Humphrey and others, of New Castle, Va.; J. C. Langhorne and J. W. F. Allemon, of Salem, Va., and others are the incorporators of this company, which has applied for a charter in Virginia.

Salem & Southern.—A. B. Bowman, J. C. Langhorne, T. M. Starkey, George W. Palmer, J. W. Berry and others are the incorporators of this new Virginia railroad.

Sandusky, Mansfield & Newark.—At the annual meeting of the stockholders at Sandusky, O., Jan. 20, John Gardiner and E. G. Gardiner of Norwalk, O.; Jay O. Moss, Clark Rude, C. H. Moss and A. C. Moss, of Sandusky; L. J. Tracy, of Mansfield, and C. F. Meyer and Robert Garrett, of Baltimore, were elected directors. John Gardiner was elected President, and Jay O. Moss Vice-President and Treasurer.

San Francisco & North Pacific.—The annual meeting of the stockholders of the company was held at San Francisco, Cal., Jan. 19, when the following directors were elected for the ensuing year: J. F. Burdin, Peter J. McGlynn, Alfred L. Seligman, F. N. Lilienthal, Charles F. Hanlon, Russell J. Wilson and Henry T. Scott. J. F. Burdin was elected President; P. N. Lilienthal, Vice-President; Alfred L. Seligman, Treasurer; Henry C. Whiting, General Manager, and Thomas Mellersh was appointed Secretary and Controller.

Southwest Virginia Central.—The incorporators of the company are: R. H. Adams, J. L. Radford and A. Robinson, Radford, Va.; H. D. Ribble, N. R. Stanger, Blacksburg, Va.; J. W. Marshall, New Castle, Va.; Deatur Axtell, Richmond, Va., and others.

Tennessee, Ashville & Coosa.—The following Directors were elected at a meeting at Ashville, Ala., last week: Andrew Johnson and R. H. Williams, of Chattanooga, Tenn.; Judge L. F. Box and J. A. Embrey, of Ashville, Ala. The Directors elected the following officers: A. Johnson, President and General Manager; Judge L. F. Box, Vice-President; R. H. Williams, Secretary and Treasurer.

Trinity, Cameron & Western.—The following officers were elected at a recent meeting at Cameron, Tex.: John M. Hefley, President; N. S. Walton, Vice-President; R. Lyles, General Manager; Monta J. Moore, Secretary and Treasurer. John M. Hefley, R. Lyles, N. S. Walton and Monta J. Moore were authorized to contract for the building of the road.

West Virginia Central & Pittsburgh.—At the annual meeting at Piedmont, W. Va., the following directors were re-elected: H. G. Davis, S. B. Elkins, William W. Taylor, John A. Hambleton, Thomas B. Davis, James G. Blaine and R. C. Kerens. The board organized by the election of H. G. Davis, President; S. B. Elkins, Vice-President, and Edward S. Moore, Secretary and Treasurer.

West Virginia & Pennsylvania.—At a meeting at Fairmount, W. Va., the following officers were elected: R. T. Lowndes, President; Joseph E. Sands, Secretary, and J. C. Beeson, Treasurer.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Adirondack & St. Lawrence.—Work on the new road near Remsen, N. Y., for the past four weeks has been progressing slowly. The recent storms and cold weather have delayed matters greatly, but an effort is being made to push the work with a largely increased force. The Black River bridge is nearly completed and the first train will cross the bridge the latter part of this week. As soon as the track is laid to Woodhull Elmira Bridge will be put in place at once by the Elmira Bridge Co., of Elmira.

Ahnapee & Western.—The contract for building this road, which is to be a branch of the Keweenaw, Green Bay & Western, has been let to McDougal & Beacon, of Milwaukee. The line to be built is 13 miles long, extending from Luxemburg, west of Keweenaw, on the Keweenaw, Green Bay & Western, northeast to Ahnapee, Wis., on Lake Michigan. It is proposed to extend the line 18 miles further north to Sturgeon Bay, but no definite arrangements have been made for building this part of the line.

Arcadian, Gulf Coast & Lakeland.—Contracts for building and completing the 80 miles of this road from Lakeland, Fla., have been recently let to Gaboury, Armstrong & Co., of Rome, Ga. The contractors have already commenced the grading and at present probably about 10 miles of this work has been finished. The first section of 20 miles is to be graded by the middle of February. The line extends through a level country in the middle and western part of Florida and will include for the most part only earthwork. Most of the streams to be crossed are not navigable, and as no drawbridges will be required the bridge work will be inexpensive. The road is projected to traverse the phosphate district of Florida, starting at Lakeland on the north and extending in a southwesterly direction through Keyesville to Braidentown and Sarasota. The second line is to be built from Keysville, a few miles from Lakeland in a southeasterly direction to Arcadia, and thence south west along the west bank of the Peace River to the main entrance to Charlotte Harbor at Boca Grande. The aggregate length of the road with branches will be 176 miles. The branch to Sarasota, which is the line under contract, has been surveyed six times, and five surveys have been made for the line between Keysville and Boca Grande. First mortgage bonds have been authorized by the company at the rate of \$10,000 a mile, the capital stock being \$7,500 a mile.

Atlantic, Staunton & West Virginia.—A bill has been introduced in the Virginia legislature to incorporate this company, with Henry Hutchinson, O. K. Lapham, J. W. Bodley, Reeves Catt, E. C. Vincent and others as incorporators. The company is authorized to build a railroad from the York or Potomac River, near the Chesapeake Bay, west to Staunton, Va., and a point on the West Virginia line.

Austin & Northwestern.—Ricker, Lee & Co., of Galveston, Tex., have been awarded the contract for building the 10 miles of the extension from Fairland, near Marble Falls, west to the Llano iron mines, a distance of 29 miles. The locating survey has just been completed to Llano. The contract just let includes the bridge over the Colorado River.

Bellingham Bay & Eastern.—The contract of A. L. McCoy & Co., of Tacoma, Wash., to build the road has been confirmed, and the firm has begun the grading near New Whatcom, Wash. Edward Eldridge is President and J. J. Donovan, of Fairhaven, is Secretary.

Berkley & South Mills.—A bill has been introduced in the Virginia legislature to charter this company to build a railroad from Berkley on the Southern branch of the Elizabeth River near Portsmouth to South Mills, N. C. This is practically the same line as that of the Norfolk & South Mills Railroad, which recently applied to the legislature for a charter.

Burlington & Missouri River.—The tracklaying recently begun on the graded road beyond Beverley, Neb., has been completed to Waueta, Neb., 24 miles northwest, where the work will be suspended for the present. The road is graded beyond Waueta, toward Holyoke, Col., and the line may be completed to that point soon. It is proposed to begin the operation of the line to Waueta Jan. 25, and the towns have arranged for a demonstration that day.

Cambridge & Clearfield.—The contractors are working from both ends of this branch of the Pennsylvania, and it is expected that the tracklaying will be completed this week. The grading has been completed for some time between Taylor and Brubaker Junction, a distance of about 20 miles. D. F. Keenan, of Westover, Pa., has the contract for tracklaying on the northern section, and Keller & Crossen, of Loretto, Pa., are the contractors for the tracklaying on the southern end. The branch now being completed is a line extending from Taylor, on the Ebensburg & Cresson, east of Ebensburg, north along Chest Creek and Walnut Run to the connection with the line now in operation for a few miles south of La Jose on the Pennsylvania & Northwestern.

Cambridge, Minneapolis & Duluth.—This company has been incorporated in Minnesota, with a capital stock of \$500,000, for the purpose of building a line from Cambridge, Minn., to the St. Paul & Duluth, connecting with that line at North Branch or Harris. The organization has been previously reported. The officers are: H. F. Baker, President; D. O. Anderson, Vice-President; C. W. Van Wormer, Secretary, and O. A. Hollin, Treasurer.

Canadian Roads.—Among the companies applying at this session of the Canadian Parliament for amendments of their charters, extending the time for construction, are the Wood Mountain & Qu'Appelle; Lake Manitoba; Manitoba & Southeastern, and Belleville & Lake Nipissing. Application has been made for a charter to build a line from Carp to Sharbot Lake, Ont., and for a charter for the Vancouver Northern, Peace River & Alaska.

Central Counties.—A branch now surveyed, will probably be built next summer between South Indian and Rockland, Que., which is expected to be of convenience in shipping lumber from the mills at Rockland. A second branch will be built between Caledonia Springs and Vankleek Hill, Que., on the line now in operation.

Champion Lumber Company.—A corrected statement is sent us concerning the railroad being built by this company. Only about one mile has been graded so far, from the mills at Orvisburg, Miss., on the New

Orleans & Northeastern Railroad.—The track is now being laid on this road, about 75 men being employed in the construction work. The line is standard gauge and 35-lb. rails are being laid. Funds have been subscribed to complete the line as projected by May 1 next. The new road is being built chiefly for the use of the lumber company. N. M. Brandon, of Meridian, is Chief Engineer.

Chesapeake, Fredericksburg & Western.—A bill allowing this railroad two years to commence the construction of its road is under consideration in the Virginia legislature. The road is to commence near tidewater in the counties of Gloucester, Mathews or Middlesex and extend thence by the city of Fredericksburg to a point on the West Virginia line in the counties of Augusta or Rockingham. The incorporators are Judson J. Embry, P. V. D. Conway and W. A. Little, of Virginia, and Levi E. Thorne and Edwin Bolitho, of New York.

Chicago, Fort Madison & Des Moines.—It is reported that the company has arranged to complete the extension to Ottumwa, Ia., early in the spring, and that the line may then be continued still further west. The road is now in operation to Libertyville and considerable grading has been done west of that point on the 20 miles to Ottumwa. Very little work would be required beyond repairing the grade before the tracklaying could be commenced. It is understood that the rails have been purchased.

Chicago, Keokuk & Southwestern.—Articles of incorporation were filed in Illinois last week by this company. It proposes to operate a railroad from Havana west about 75 miles to Keokuk, Ia. The capital stock is \$1,000,000. The incorporators are William Logan, W. K. Johnson, George D. Rand, James H. Anderson and James W. Summers, of Keokuk; M. Leroy and Henry R. Dickinson, of Hamilton, Ill.; Thomas Hamer, of Vermont, and George Edmunds, of Carthage, Ill. The survey is being made, at present the engineers being near Carthage.

Deer Creek & Susquehanna.—At a recent election of Directors of the railroad company it was stated that the affairs of the road are in a favorable condition, and in a short time, probably, there will be arrangements made which will insure the completion of the road from Belair to Stafford, Ind., at least.

Delaware & Hudson Canal Co.—The company has awarded a contract to Shanahan & Son, of Tribes Hill, N. Y., to rebuild the roadbed about two miles north of Crown Point, N. Y., further inland, at the point where the old bed sank 20 ft. in depth for a distance of 200 ft. The gap at the time was closed with a Georgia pine trestle. This change of bed necessitates a cut through rock 3,500 ft. in length and an average depth of 25 ft., and a shallow fill of about 500 ft. Twenty-nine thousand cubic feet of rock are to be blasted.

Deming & Utah.—Incorporated in New Mexico to build a railroad from Deming, Grant County, to Gallup, Bernalillo County. The incorporators are: Gustav Wormser, F. H. Siebold, D. Bannon, David A. R. McLaren, all of Deming, and L. L. Fielder, of Silver City, N. M. The capital stock is \$3,000,000.

Denver, Lakewood & Golden.—It is reported that negotiations are about concluded for the sale of this road, which is built for some 15 miles west of Denver, to a syndicate of Denver capitalists, who were making the purchase in the interests of the Denver, Apex & Western Railroad, which proposes to build a line from Denver West, to Georgetown, Col.

Gladesville.—This company has applied to the Virginia Legislature for incorporation. It is proposed to construct a road from Gladesville in Wise County and to a point on the Norfolk & Western or the Louisville & Nashville. The incorporators are: E. M. Fulton, J. E. Lippis, N. B. Dotson, C. F. Flanary, T. G. Wells, T. M. Anderson, O. M. Vicars, R. P. Bruce, J. C. Richmond and others.

Great Northwest Central.—It is said on good authority that this railroad will build a line to Carrollton, Man., this summer, providing that the town and neighboring municipalities grant suitable bonuses. The grade of the old Souris & Rocky Mountain line, which intersects the road south of Rapid City, Man., will be utilized for this branch if it is built.

Gulf & Ship Island.—The railroad is said to have been purchased by Chicago capitalists, who propose to build the line through to Jackson, Tenn., a distance of about 350 miles. The road is completed from Gulfport, Miss., north 20 miles. W. H. Hardy, Meridian, Miss., is President.

Jersey City, Newark & Western.—The principal work which the contractors are now engaged on is the work across Bergen Neck, and on the line adjoining the Newark Bay drawbridge. The Newark Bay bridge will be over a mile long altogether. The firms who have not yet completed their contracts are G. W. Rogers & Co., 44 Broadway, New York City; John Shields, Flemington, N. J.; Rehill & Edwards, Jersey City; Ross & Sanford, Jersey City; I. H. Hathaway & Co., Philadelphia; Penncoyd Bridge Co., Philadelphia, and the Elmira Bridge Co., of Elmira, N. Y.

Johnsonburg & Bradford.—The work of clearing on the location south of Bradford, Pa., was practically completed this week. The contractors have begun the grading within a few days, and the number of men now at work is between 200 and 300. The line is to extend from Howard Junction, near Bradford, to Johnsonburg, Pa., 20 miles. The contract for the grading, masonry and trestles has been let to Brendlinger, Nearing & Kelly, of New York City, their present headquarters being at Bradford, Pa.

Mankato & Northeastern.—Articles of incorporation have been filed in Minnesota with a capital stock of \$1,000,000. The company was recently organized at Mankato, Minn., and as previously reported proposes to build a road from Mankato northeast to a point on the Mississippi River, probably Hastings. It is thought, however, that the line will be extended to some Lake Superior point. The officers are P. H. Carney, President; J. D. Hilger, Vice-President; J. G. Fowler, Secretary; D. L. Rose, Treasurer.

Menominee, Pacific & Puget Sound.—The President reports that the locating surveys are now being made north of Pensacola, Fla., for 100 miles. The surveys and profiles have been made, he says, for the entire line from Pensacola to Memphis. The contract to build the road has been let to the South and West Land Development and Railroad Construction Company. The length of the road will be, he estimates, about 430 miles. The

President is S. N. Van Praag, of Pensacola, and the Secretary is C. H. Dishman, of Nashville.

Mexican Southern.—The track on this line has been laid from Puebla as far south as Culiacan, State of Oaxaca, Mexico, 255 kilometres or 160 miles. The grading has been finished, ready for track, from Culiacan to kilometre 271 from Puebla. The construction is being actively pushed to the city of Oaxaca, 367 kilometres from Puebla, and should be finished by next September. The number of men now at work is between 4,500 and 5,000. Track was laid during the year 1891 from kilometre 175 to kilometre 255, equal to 80 kilometres, or 50 miles, and the line is now in operation from Puebla to Tecomavaca, 224 kilometres. Read, Campbell & Co. are the contractors. Wm. Morcom, of Puebla, is manager.

Newfoundland.—Reid, Middleton & Co., of Montreal, contractors for the construction of this road, have 65 miles, out of the 270 miles under contract, completed and in running order.

New Roads.—Capitalists from New Castle, Pa., and Jamestown have commenced to build a branch road from Ellwood Junction to coal lands south of Ellwood, Pa. The branch will be 3½ miles long and will run up the valley from Thompson Run. It will be an extension of the Beaver & Ellwood road.

A company is being organized at Ottumwa, Ia., to build a line of railroad to Tremont, 18 miles north of that city, connecting with the Chicago & Northwestern and the Iowa Central roads touching that point, giving these roads direct communication to Ottumwa.

A meeting was held at Durango, Col., to arrange for building a railroad from Durango to Creede, Col. The line is from Durango to Florida River, thence to Pine River, along Pine River, through the Weminichi Pass, thence down the Rio Grande to Creede. The grade is an easy one, and the new line will be less than 75 miles. H. H. Strater and H. J. Arnold, of Durango, are interested.

Norfolk & Western.—The belt line at Christiansburg, Va., noted last week, is being built by this company, and will be completed early in the spring, the contractors for the work being Rogers & O'Brien, of Roanoke. The line is three miles long and is to extend around the city of Christiansburg, and will develop red hematite iron ore fields near that city.

Norfolk, Wilmington & Charleston.—A surveying party in charge of George M. Brockman, of Norfolk, Va., S. C., northward. Other parties of engineers are in this field, and it is expected that the preliminary survey from Norfolk to Charleston will be completed by March 1.

Northern Pacific.—The attorneys of the company are preparing a trust deed under which the \$3,347,000 now deposited with the Farmers' Loan & Trust Co., of New York, to the credit of the preferred stock, will be placed. The bonds when originally set aside for the preferred stock were not placed in trust, and this is what the new deed aims to do.

Otis Elevating.—The organization of this company has been completed, the right of way acquired, contracts for construction signed, and work commenced. The road is to be 7,000 ft. long from a point connecting with the Catskill Mountain Railroad near Palenville, N. Y., to the summit of the mountain near the Catskill Mountain House and the Kaaterskill Hotel. The elevation to be overcome is 1,800 ft. The contractors are Charles L. Buckle for timber work, Pennel & Obern for grading and masonry, and Otis Brothers & Co., of New York, who agree to have the road in operation on or before July 1. Among those interested in this scheme are: Orrin Day, Frederick Hill, Isaac Pruy, C. L. Beach, of Catskill, N. Y., and C. L. Dickerson, William R. Grace, A. Van Santvoord, Col. C. G. Otis and William H. Ritter, of New York. The supervising engineer is Thomas E. Brown, Jr.

Pennsylvania.—Work has begun on the new branch from Allen's lane, on the Chestnut Hill division, north along White Marsh Valley to the Trenton cut off at Fort Washington, Pa. A large force of laborers under contractors Keller & Crossen, of Lancaster, have commenced the four miles of grading. The roadbed will be wide enough for double tracks the entire distance. John T. Dyer, of Norristown, has the contract for the two miles east of Fort Washington. The line is six miles long.

Philadelphia & Reading.—The branch of the road to Frankford, near Philadelphia, is, it is said, now assured. The right of way from Frankford to Tabor Station has, with the exception of one property, been secured, and the amount necessary for building the road is already subscribed, principally by the residents along the route.

Potomac River & Great Falls.—A bill has been introduced in the Virginia legislature to incorporate the company to construct a road from Great Falls, in Fairfax County, Va., to a point on the Potomac River between Great Falls and the city of Alexandria. The capital stock is \$250,000.

Potts Valley Railroad & Iron Co.—A bill has been introduced in the Virginia legislature to charter this company, to construct a road from a point on the Chesapeake & Ohio near Covington south, to connect with the Norfolk & Western Railroad near Big Stony Creek, in Giles County.

Prescott & Northwestern.—New articles of incorporation were filed in Arkansas last week amending the charter granted Oct. 6, 1890, and reorganizing the company. The road as far as constructed extends from Prescott County, Ark., northwesterly through Nevada County into Hempstead County. The part to be constructed runs in the same general direction through Hempstead County and into Pike County. The capital stock is \$30,000.

Red River Valley.—Articles of incorporation were filed with the Secretary of State of Minnesota on the 25th inst. The direction of the line is not given, but the principal terminal is to be East Grand Forks, Minn. The incorporators are J. J. Hall, of St. Paul, and C. W. Peter, of Grand Forks. Capital stock, \$100,000.

Rhinemond, Blackstone & Southern.—The company has applied to the Virginia legislature for a charter, with Freeman Epes, R. W. Tuggee, James L. Anderson, and others as incorporators. The company is to build a railroad from Richmond or Manchester southwest through Chesterfield, Amelia and Nottoway counties to Blackstone, and thence to the North Carolina line at a point near Henderson or Ridgeway.

Roanoke & New Castle.—This company, whose incorporation in Virginia was noted last week, has been

organized by A. Z. Koiner, R. H. Woodrum, J. T. Engleby, of Salem, Va., and others to build a railroad from Roanoke to connect with a line in Craig County and to extend to the Kentucky State line.

Rochester & Honeoye Valley.—The laying of the rails on the Honeoye Valley branch has been completed from the Lehigh Valley Junction south to Red Creek. The contractors are laying 3,000 ft. of track a day toward Rochester, N. Y.

Sandusky & Columbus Short Line.—It was not stated in the account printed last week that a contract had already been awarded to a construction company for completing the line to Columbus, O. The contracts now to be let are sub-contracts and will be let by March 15, and possibly at an earlier date. They will probably be in 10-mile sections, and 10 sections may be let at the time stated, or perhaps only three sections. The 13 miles of track laid south of Sandusky to Bellevue will soon be ballasted and put in operation. South of Bellevue complete surveys have been practically made since Dec. 1 last to Columbus. There are now three engineering parties completing the surveys. Three different lines have been run to Columbus, and for part of the distance four routes have been surveyed. The work to be let in the spring will consist almost entirely of earthwork, with maximum grades of 40 ft. to the mile, and the maximum curvature outside the city will be only three degrees. There are only four bridges to be built, 180 ft., and 130 ft., and two 80 ft. long. F. J. Ald, of Marion, O., is Chief Engineer.

Southern California.—The extension of the San Bernardino & Eastern line between San Bernardino and Mentone, Cal., seven miles, which was recently completed, has been opened for traffic. The building of the new branch completes a belt line through the East San Bernardino Valley, the line passing through Highland, Mentone, Redlands and Victoria to San Bernardino. The company announces the inauguration of excursion service over 160 miles of road, between the San Bernardino Valley and Los Angeles, which it calls the "kite shaped track."

Southern Pacific.—The work upon 18 miles of the new track at Yuma, Ariz., on the new location, has been completed and has become a part of the main line over which the regular trains are running. The entire section of new line will be about 30 miles long, and when it is completed, which will be in a very short time, all danger of floods will have been averted. At Summit, just east of Benson, three miles of the track will be moved to higher ground to avoid danger from washouts.

Tallapoosa.—The Tallapoosa Lumber Manufacturing & Railroad Co. has commenced the construction of 21 miles of standard gauge road from Tallapoosa, Ga., and expects to extend the road to a connection with the Central of Georgia at Roanoke, Ala.

Trinity, Cameron & Western.—The charter for the company was filed in Texas last week. The road to be built is from Trinity west through Cameron to Granger, Tex., a distance of 100 miles. The company was organized at Trinity and Cameron last fall, and the preliminary survey between Cameron and Granger has just been finished. The engineers are preparing the profile and estimates. Part of the right of way has been obtained. J. M. Heffey, of Cameron, is President.

Velasco Terminal.—The tracklaying has been completed between Velasco and Chenango Junction, 22 miles, the last rail having been laid at the latter place Jan. 24. The road was built by the Brazos River Channel and Dock Co., and connects at Chenango Junction with the Columbia branch of the International & Great Northern. It is proposed to run trains from Houston, over the Columbia branch, and to Velasco, about 60 miles south of Houston. Velasco is situated on the deep water harbor at the mouth of the Brazos River, south of Galveston. Burkett, Burns & Murphy, of Fort Worth, Tex., were the contractors for the road now completed. Downey Bros. have a contract for an extension three miles long, from Velasco along the Gulf coast.

Virginia Roads.—Bills have been introduced in the Virginia legislature to incorporate the Richmond, Nottoway & Blackstone and the Gladesville roads, and to amend the charters of the Chesapeake, Fredericksburg & Western and the Metropolitan Western.

Williamsport & North Branch.—This railroad, in operation between Halls Station on the Philadelphia & Reading and Nordmont, Sullivan County, Pa., of which George L. Sanderson has been President, has passed into the hands of H. L. Taylor, of Buffalo, N. Y. He secured by purchase a controlling interest in the property. The company will be reorganized and some extensions may be expected. Among them may be the construction of the line from Halls to Williamsport, a distance of nine miles.

Williams Valley.—Trains are running on the three miles from Tower City to the connection with the Philadelphia & Reading near Brookside, Pa. The grade between the two towns is quite heavy, the road being in a mountainous part of Schuylkill County. It is proposed to extend it west a few miles toward the Susquehanna River to Lykens and a connection with the Northern Central.

GENERAL RAILROAD NEWS.

Birmingham, Powderly & Bessemer.—A suit has been brought in the United States Court, at Birmingham, Ala., on the petition of the Mercantile Trust & Deposit Co., of Baltimore, for the foreclosure of the first and second mortgages on the property.

Central Counties.—A special general meeting will be held at Ottawa on Feb. 16 for the purpose of authorizing the directors to issue new bonds, and to confirm a mortgage deed upon the property of the company and to ratify a lease of the completed section of the road to the Canada Atlantic.

Central New England & Western.—The Philadelphia & Reading has arranged for the transfer of the Poughkeepsie Bridge lines to its system through a guarantee of the bonds of this railroad and of the Poughkeepsie Bridge Co. The agreement is made through the Delaware & New England, the controlling company, which owns all the stock of the railroad companies and majority of that of the bridge company. A bondholders' committee controls a majority of the bonds of the bridge, and it is said that the committee may oppose some of the terms of the guarantee, but the bondholders of the railroad have approved the transaction. The Reading is to give a guarantee of

\$3,750,000 in four per cent. bonds to replace the six per cent. bonds of the railroad company, amounting to \$5,000,000. That is, a four per cent. bond is given for 75 per cent. of the present bonds. The Delaware & New England will transfer two-thirds of the stock of the bridge company. The bonded indebtedness of the bridge is \$5,000,000, the bonds and preferred stock of the Central New England amount to \$4,100,000, and the bonds of the Delaware & New England to \$1,300,000.

Chattanooga Southern.—Newman Erb, of Kansas City, has been appointed Receiver by the Judge of the United States District Court at New Orleans, on the petition of E. Summerfield, a bondholder, who alleges that the road does not earn its fixed charges, has not paid the interest on its bonds, and asserts that the trustee of the bonds, the Central Trust Company, is disqualified from acting for the interest of the bondholders.

East Line & Red River.—The road was sold at Jefferson, Tex., last week to Simon Sterne, acting as attorney for Henry W. Poor, the Trustee of the first mortgage bonds. The road is part of the Missouri, Kansas & Texas system.

East Shore Terminal.—The proposal for an increase in the capital stock and for the creation of a second mortgage is to be acted upon at a special stockholders' meeting to be held at Charleston, S. C., Feb. 5. It is proposed to issue second mortgage bonds to the amount of \$300,000, and to increase the capital stock a similar amount.

East Tennessee, Virginia & Georgia.—The railroad reports gross earnings for December of \$765,400, a decrease of \$82,541 as compared with the same month of previous year, and net earnings of \$276,148, a decrease of \$66,776. For the six months ending Dec. 31, the gross earnings were \$4,402,003, a decrease of \$295,773 as compared with the corresponding period of previous year, and net earnings \$1,290,351, a decrease of \$87,570.

Herkimer, Newport & Poland.—The capital stock of the company was increased at a special meeting of the stockholders this week, in New York City, to \$500,000. The capital stock of the old narrow gauge company was \$250,000.

Illinois Central.—The following is the comparative statement of earnings for the six months ending Dec. 31, 1891 and 1890, December, 1891, being estimated:

	1891.	1890.	Inc. or Dec.
Gross operating receipts.....	\$10,068,438	\$9,320,262	I. \$748,176
Operating expenses.....	6,578,297	5,843,832	I. 734,465
Taxes.....	167,779	127,346	I. 39,733
Fixed charges.....	2,006,418	1,986,700	I. 9,638
Profits from traffic.....	\$1,016,644	\$1,052,224	D. \$35,580
Miscellaneous income.....	341,392	327,886	I. 13,506
Total profits.....	\$1,358,036	\$1,380,210	D. \$22,174
Surplus dividend fund.....	216,550	215,257	I. 1,302
Dividend payable March 1, 1891, and March 1, 1892.....	1,125,000	1,350,000	D. 225,000
Surplus.....	\$449,595	\$245,467	I. \$204,128

International & Great Northern.—It is reported that an agreement had been virtually reached between the large bondholders of the railroad and the Missouri Pacific interest for the reorganization of the company, which is now in the control of receivers. Attempts have been made to effect a reorganization, but they have failed because of the difficulty of reconciling the views of the bondholders and the directors of the Missouri Pacific, which holds control of half the stock. The agreement now reached is said to provide for the payment of cash on half the coupons of the first mortgage bonds, the remainder to be paid in five per cent. interest bearing notes. The second mortgage bonds are to receive third mortgage bonds for past due interest, and the rate of interest on the seconds is to be 4½ per cent. for six years and 5 per cent. thereafter.

Ohio & Mississippi.—The State Circuit Court at Cincinnati, O., has decided against the present board of directors in the suit brought to decide the legality of the trust vote cast at the recent annual election in favor of Messrs. McKinley, Walsh and Farnstock. The court declared the election of J. H. Smith, E. Whittaker, E. Howland and R. Green, and their recognition as directors to be illegal. The defendants represent the minority of the stockholders who are opposed to the lease to the Baltimore & Ohio on the terms recently published. The stock voted for the defendants was held in a trust representing the committee of English stockholders, who had agreed to the lease to the Baltimore & Ohio.

Oregon Pacific.—At the foreclosure sale at Corvallis, Or., Jan. 21, the road was sold for \$1,000,000 to the bondholders' committee. It is said that practically all of the bondholders have agreed to the plan of reorganization which provides for a first mortgage of \$18,000,000 at five per cent. to run 50 years and a second income mortgage bond for \$10,000,000. Holders of present bonds will get 50 per cent. in new first mortgage bonds and 50 per cent. in income bonds for their principal. The balance of the first mortgage bonds will be used for settling the floating debt and receivers' certificates.

Philadelphia & Reading.—The statement of earnings for December, the first month of the fiscal year, shows the following comparisons with 1890:

	1891.	1890.	Inc.
Gross receipts.....	\$1,881,522	\$1,666,111	\$195,411
Operating expenses.....	973,838	996,462	12,624
Profit in operating.....	\$907,684	\$699,649	\$208,035
Other receipts.....	39,990	33,708	6,263
Profit for month.....	\$947,654	\$733,355	\$214,299
Expenditures for permanent improvements.....	\$18,418	\$49,783	31,365
One-twelfth of fixed charges.....	625,000	611,760	13,231
	\$613,418	\$631,552	\$18,134
Surplus.....	\$304,396	\$71,301	\$232,433

The statement of the Philadelphia & Reading Coal & Iron Co. for December, 1891, shows gross receipts of \$1,784,422; gross expenses (including operating expenses, \$1,623,342; colliery improvements, \$74,392; permanent improvements, etc., \$13,764); of \$1,712,000; profit from mining, \$72,323. The surplus for the month is \$6,823,96, an increase of \$64,955.07 over December, 1890, when there was a deficit of \$58,132.

Richmond & West Point Terminal.—There is considerable discussion as to what form the reorganization plan of the Olcott committee will take. Chairman

Olcott of the committee says that he has no idea when the plan will be completed, and can give no information in regard to its general form. It is reported, however, that the plan has been agreed on so far that it can be stated that a new company, to be called the "The Great Southern Company," will take the place of the present corporation, that it will have a capital stock of about \$150,000,000, "and a consolidated mortgage heavy enough to provide for present needs and to take up existing underlying liens as they mature. It has not been decided yet whether the East Tennessee system will be included in the Great Southern Company or not. The prospects at present are that it will be released in all respects from the Richmond Terminal's control or that of its successor company, and will be operated by its present managers, as heretofore, as an independent system."

Western Maryland.—An ordinance was introduced in the Baltimore City Council Jan. 21 providing for the sale by the Finance Commissioners of the city's interest in the railroad to John H. Bryant, of New York, and his associates, for \$1,895,000. The ordinance is similar to the one offered last year. If deemed necessary, the Mayor shall request the legislature to pass an act to change the charter so as to enable the purchasers to choose a majority of the directors. The offer of \$1,875,000 for the city's interest has been renewed by General Bryant.

West Virginia Central & Pittsburgh.—A preliminary report of the operations of the road for the past year shows that the net revenue was \$310,150, against \$266,320 for the year previous, a gain of \$43,830. After paying all fixed charges the profits to the road were \$134,082. During the year there was expended for additional rolling stock \$62,272, but with the exception of this item and the amount paid for real estate and second track, all improvements have been charged to operating expenses, the latter being 50 per cent. of gross receipts. The general condition of the road has been improved during the year, progress made on second track and 24 miles of additional road built, connecting at Belington, W. Va., with the Baltimore & Ohio Railroad, and at Fairchance with the Pennsylvania Railroad, thus providing an outlet by these systems to the lakes and the Northwest by way of Pittsburgh.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, Jan. 27, 1892.

The Rock Island took an appeal from the decision of Chairman Finley fining the road \$300 for maintaining an outside office in Chicago, noted in this column Jan. 22, and Messrs. E. A. Ford, A. J. Smith and J. F. Tucker were selected as arbitrators. The case has been heard and the arbitrators sustain the chairman.

An arbitration has also been had in the case decided against the Rock Island Nov. 30 respecting the sale of excursion tickets over its line by the Burlington, Cedar Rapids & Northern (noted in this column Dec. 4), and the arbitrators, Messrs. S. K. Hooper, O. W. Ruggles and E. L. Lomax, reverse the decision of the chairman on the ground that the intent of the agreement is not to hold a member criminally liable for a violation of its provisions by a connection, when the member has no knowledge prior to the act, but only to require that upon receipt of information of intention on the part of a connecting line to do an act in violation of agreement prompt measures shall be taken to prevent such action. In the present case the evidence showed that the Rock Island had no prior knowledge, and upon receipt of notice at once took all possible measures to restrain its connection.

In the case of the appeal of the same company from a decision of Chairman Finley declining to grant authority to pay increased commissions on seaboard immigrant business, the arbitrators, Messrs. Jas. Barker, C. P. Atmore and Jas. V. Mahoney reverse the decision so far as it relates to commissions on business to California points, on the ground that they find the preponderance of evidence proving beyond a reasonable doubt that excessive commissions are being paid in New York on this business. They do not touch upon the payment of commissions to other points. This action is taken under the agreement of the Western Passenger Association and does not affect the situation in the Transcontinental Association.

At the meeting of the General Managers' Association of Chicago, held the 22d inst., E. St. John was elected President, vice E. T. Jeffery, resigned. Among the subjects considered were: Free Storage and Free Handling of Freight; Division of Demurrage Charges with Lines Furnishing the Cars. Both matters were referred to special committees. Meetings will hereafter be held every 60 days and special meetings at the call of the chair.

A meeting of the committee on lake and rail differentials of the Central Traffic Association has been called for Feb. 3 to consider the question of proportionate rates from lake ports on traffic received from lake lines; also lake and rail differentials in general.

For the 14 months ending Dec. 31, 1891, the period during which the agreement among the northwestern lines has been in effect, 171,740 full and 7,217 half fare passengers have been transported between Chicago and St. Paul and Minneapolis, local and through, in both directions. Of these 51,000 were first class, 42,077 first class through, 34,635 second class, 3,484 third class, 15,639 tourist, 15,903 special excursion, and 16,219 mileage. The percentages carried by the lines were as follows:

Chicago, Milwaukee & St. Paul.	27.4
Chicago & Northwestern.....	20.3
Wisconsin Central.....	17.9
Chicago, St. Paul & Kansas City.....	14.8
Chicago, Burlington & Northern.....	10.3
Albert Lea Route.....	9.3

100.0

A proposition has been submitted to members to change the time limit in the Western Passenger Association on reduced rate tickets for the Republican National Convention from June 5, 6 and 7 to June 1, 2, 3 and 4.

Traffic Notes.

A cargo of flour (five train loads) for Galway, Ireland, was recently carried by rail from St. Louis to New Orleans over the Cairo Short Line and the Illinois Central.

The Grand Junction Milling Co., of Denver, has shipped the first carload of flour from that state for the famine stricken people of Russia. The railroads carry it free to the Atlantic seaboard.

The Chicago, St. Paul & Kansas City has put on a through second-class sleeping car between St. Paul and

San Francisco via Kansas City, the Missouri Pacific, Denver & Rio Grande, etc.

The Colonial Express between Boston and Washington via the Harlem River steamboat transfer has Pullman cars. This is, we believe, the first line of Pullman cars to run over the New York, New Haven & Hartford.

The Board of Presidents of the Trunk Line Association formally voted last week to totally discontinue the Chicago & Alton boycott. The resolution reaffirms the determination not to pay commissions or permit other companies to do it within their territory.

The Mackey lines (Louisville, Evansville & St. Louis, Chicago & Eastern Illinois, etc.) have given notice that one-way local tickets will not be good over 24 hours after time of sale, and a similar rule will apply on returning portions of round-trip tickets. If not used before the time expires the company will redeem them at any time within five days.

No attention is paid to the statement that an agent of the Trans-Missouri Association is prowling around Denver. The fact is of no account as there is hardly a day in which there is not some detective inquiring into freight and passenger matters with a view of making a case against railroads that are surreptitiously cutting rates.—Denver paper.

As noted last week, the Transcontinental lines, at their recent meeting in New York were unable to agree upon the distribution of the amount to be paid to the Pacific Mail Steamship Co. for "space rental" for the ensuing three months; the arbitrators to which it was agreed to refer the matter are the Commissioners of the Western Traffic Association.

In the application to the United States Circuit Court for a decision in equity on import rates (which were the subject of a report by the Interstate Commerce Commission) the New York Board of Trade and Transportation has been joined by the Interstate Commerce Commission, and the defendant is the Texas & Pacific road.

The Secretary of Agriculture has notified the railroads of certain extra precautions against splenetic fever among cattle which must be observed in shipments from most of the southern states and certain other territory, the limits of which are named. Exceptions are made to admit of the shipment of cattle under certain restrictions from Texas to Colorado, Wyoming and Montana for grazing purposes.

An agreement has been reached between lines interested in traffic from the seaboard via Virginia and Georgia ports to Missouri River territory to advance rates Feb. 1 from all North Atlantic seaboard territory to Memphis, Tenn., East St. Louis, Ill., and Mississippi River crossings north of there, on business destined to the Missouri River, to not less than the following differentials below the established all-rail rates from the same North Atlantic ports to East St. Louis:

Classes.....	1	2	3	4	5	6
Cents.....	10	8	6	4	4	3

The Missouri Pacific has notified the President of the Advisory Board of the Western Traffic Association that his suggestion to postpone the discussion of the complaints of that road, about its competitors' rate cutting, until the April meeting, will be acquiesced in. The April meeting under the rules will be held at Chicago, but, judging from past experience, there is little likelihood of a quorum being obtained for a meeting in that city, which will necessitate the calling of a special meeting in New York. An official of the Atchison road says that the charges of rate cutting made against that road by the Missouri Pacific were built on a very flimsy foundation. They are based on the fact that nine months ago an emergency rate on sugar was established by agreement of three transcontinental lines, the Southern Pacific, the Atchison and the Union Pacific. To be sure, they did not obtain the authority of the Commissioners to make the rate, but it was a matter in which none of the other roads was interested and no objection was raised. But it seems that the Union Pacific failed to get any of the sugar. The Southern Pacific and the Atchison got it all, and now they are accused of violating the Western Traffic Association agreement in making the rate without proper authority. The case is not similar to that of the Missouri Pacific, which led to the discharge of Traffic Manager Leeds. Technically, perhaps, we violated the agreement, but, nobody was harmed or could be harmed by our action.

General Baggage Agents.

The annual convention of the National Association of General Baggage Agents was held last week in Cincinnati. The question of checking peddlers' packs, referred to the baggage agents by the Western Passenger Association, was placed in the hands of the following special committee: Messrs. McWade, Martin, Fuller, Crabtree and Walsh. By a unanimous vote the name of the organization was changed to the "American Association of General Baggage Agents." A committee of seven was appointed to investigate the matter of concealed losses, consider the rules of the association applying to the same, and report upon some method of improving the present system of settling such claims.

Eastbound Shipments.

The shipments of eastbound freight from Chicago by all the lines for the week ending Jan. 23 amounted to 105,486 tons, against 119,086 tons during the preceding week, a decrease of 13,600 tons, and against 81,661 tons during the corresponding week of 1891, an increase of 23,825 tons. The proportions carried by each road were:

Roads.	Wk. to Jan. 21		Wk. to Jan. 16	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	17,002	16.7	16,298	15.7
Wabash.....	6,002	6.2	6,789	5.7
Lake Shore & Michigan South.....	18,57	15.0	22,784	19.1
Pitts., Ft. Wayne & Chicago.....	11,785	11.2	18,413	15.5
Pitts., Cin., Chicago & St. L.....	11,806	11.2	13,136	11.9
Baltimore & Ohio.....	8,716	8.3	7,955	6.7
Chicago & Grand Trunk.....	10,725	10.2	11,015	9.3
New York, Chic. & St. Louis.....	9,001	8.5	12,175	10.1
Chicago & Erie.....	10,239	9.7	10,625	8.9
Total	105,486	100.0	119,086	100.0

Of the above shipments 10,256 tons were flour, 58,650 tons grain, 3,486 tons maltstuffs, 6,745 tons cured meats, 10,155 tons dressed beef, 1,918 tons hides and 2,194 tons lumber. The three Vanderbilt lines carried 18.2 per cent. of all the business, and the two Pennsylvania lines 22.4 per cent.

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President.

T. W. WELSH,
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JOHN CALDWELL,
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W. W. CARD,
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The WESTINGHOUSE AUTOMATIC BRAKE is now in use on 22,000 engines and 270,000 cars. This includes (with plain brakes) 180,000 freight cars, which is about 18 PER CENT. of the Entire Freight Car Equipment of this country, and about 80 per cent. of these are engaged in interstate traffic, affording an opportunity of controlling the speed of trains by their use on railways over which they may pass. Orders have been received for 120,000 of the Improved Quick-Action Brakes since December, 1887.

The best results are obtained in freight train braking from having all the cars in a train fitted with power brakes, but several years' experience has proven conclusively that brakes can be successfully and profitably used on freight trains where but a portion of the cars are so equipped. Below is a graphical illustration of the progress made in the application of the Automatic Brake to freight cars since its inception.

Year.	No. per year.	Grand total.
1881	105	105
1882	1,085	1,190
1883	4,966	6,156
1884	15,051	21,207
1885	10,410	31,617
1886	8,946	40,563
1887	9,281	49,844
1888	27,696	77,540
1889	26,065	103,605
1890	50,502	154,107

154,107 freight cars fitted with the Westinghouse Automatic Brake, which is more than 15 per cent. of the Entire Freight Car Equipment of this country.

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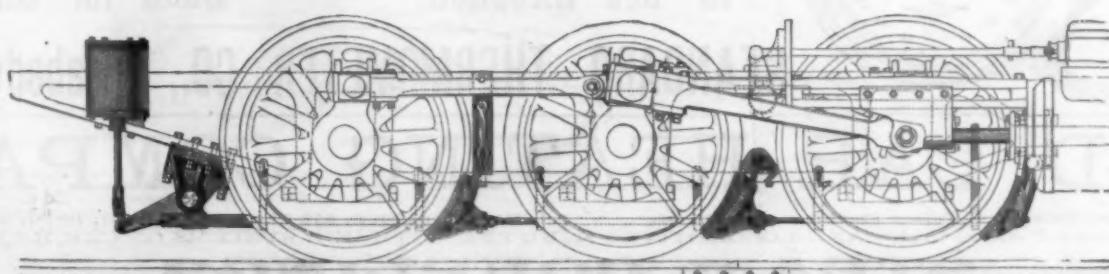
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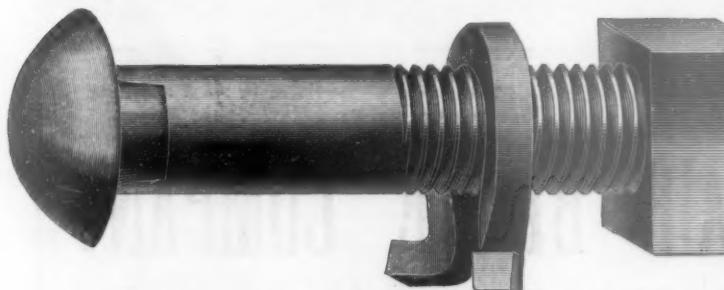
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Standard Outside Equalized Pressure Brake, for two or more pairs of Drivers, furnished to operate with either STEAM, AIR or VACUUM.

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Manufactured under D. O. Ward's Patents by the

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NOS. 236-248 BANK ST., NEWARK, N. J.

SAMPLES FREE.

This nut lock is presented on its merits as the best and cheapest device for securing track joints.

It is a torsional loop made of good quality of tempered spring steel, having horizontally inclined foot pieces, which are curved inward, thereby greatly increasing the spring-resistance and acting simultaneously; rests upon the base of angle bar, or underlying rail base in case of fish plate, preventing the loop portion from rotating and hammering down *thread of bolt*.

The nut lock for $\frac{3}{8}$ bolt made of $\frac{1}{4}$ in. square steel, standard pattern, yields a tension of 4,300 lbs. on the bolt, which is sufficient to reduce the wear of the bearing surfaces of the angle bars on the rails, imparting, as it does, a uniform bearing the entire length of the bar.

The "Standard" Nut Lock has sufficient elasticity to maintain a tight joint, which cannot be truthfully said of many light-weight single coil washers.

The "Standard" Nut Lock is, in its superficial form, similar to an annular coil twisted out of plain, i. e., the curved shoulders or ends of the loop proper are spread in the usual manner of spring coils, at which bearing points the locking friction is equal to that of the best single coil washer, and added to this it is terminated in *inwardly curved extensions*, which must apparently furnish additional short leverage spring force of a torsional character.

Distinctive Merits of the "Standard" Nut Lock, Condensed:

Fixedness of position—cannot rotate and hammer down threads of bolt.

Cannot get one end into elongated slot of angle-bar.

Unlike all previous singly placed, double washer, the Standard is interchangeable regardless of distance between bolts.

Cannot be put on wrong side out, as the outward projection of the foot pieces would prevent the nut being turned up.

Has more spring power directly under the nut than any two ordinary coil nut locks.

Being fixed in position, it offers double the locking friction of nut locks, which when in their *dead set* condition turn back with nut by the vibrative effect of passing train.

The "Standard" Nut Lock embodies the old principle of spring power improved by overcoming the objection to the double washer or nut lock, and covering the weak points of the single coil washer.

Excelsior Automatic Nut-Lock and Fish Plate Spring

These Nut Locks have been adopted by the New England Road-Masters, in Conventions held at Hartford, Conn., Oct. 19 and 20, 1887, and Boston, Mass., Aug. 15 and 16, 1888, as the best

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Sample lots furnished for trial, free of expense, by forwarding the distance between centers of fish-plate bolts. Correspondence and orders solicited.

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Simple.
Easily
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Very
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THE NATIONAL LOCK WASHER

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Sixty Millions in Use in
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For Use on All Kinds and
Classes of Work.

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Made for all
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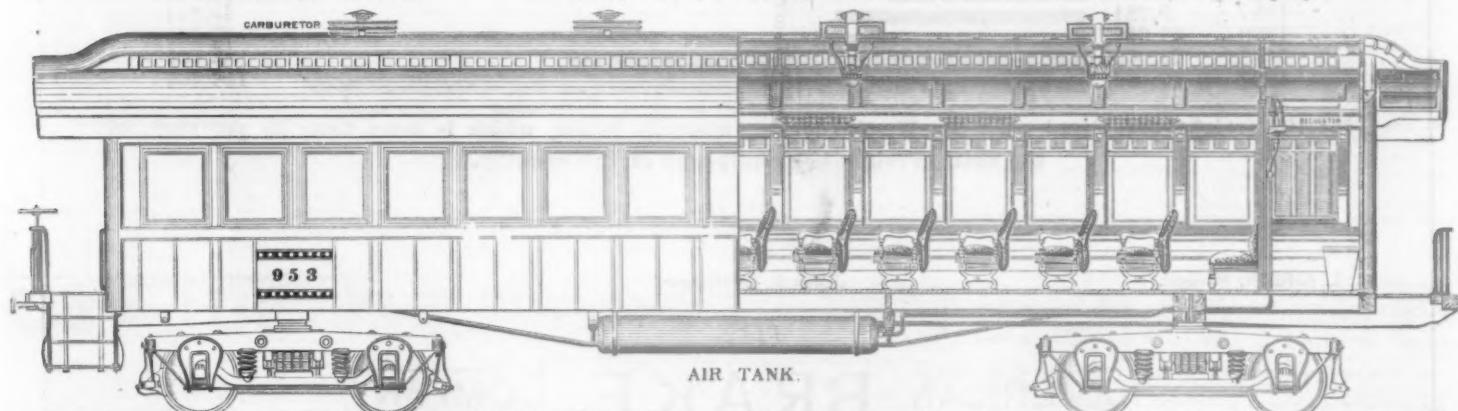
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Samples free of
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The Greatest Light of the Age.

Extensively Used by the Pennsylvania Railroad and the Pullman Palace Car Company.



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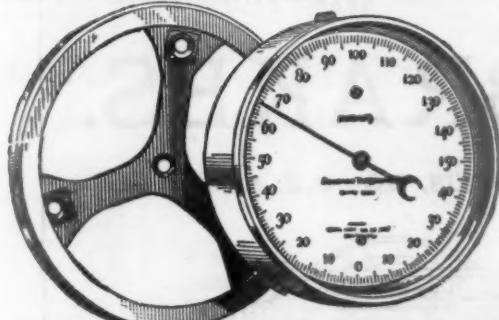
It cannot fail to attract the attention of practical railroad managers on account of its absolute safety, durability, simplicity, efficiency and its great economy. Each amp gives 100 candle-power illumination. One hundred hours' continuous service from one charging of the carburetor.

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STEAM COUPLINGS.

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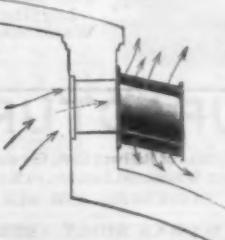
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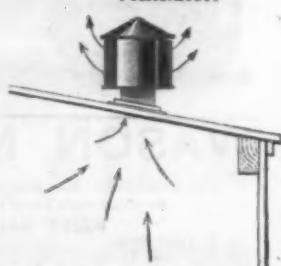
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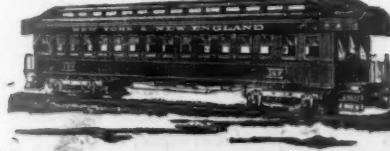
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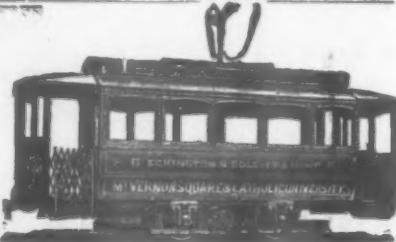
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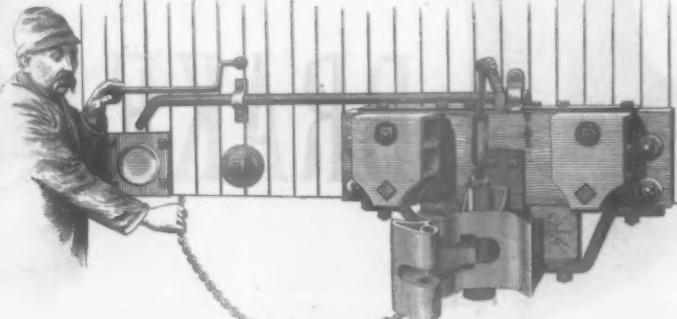
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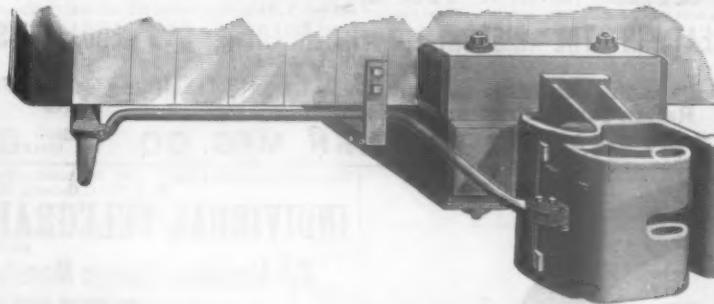
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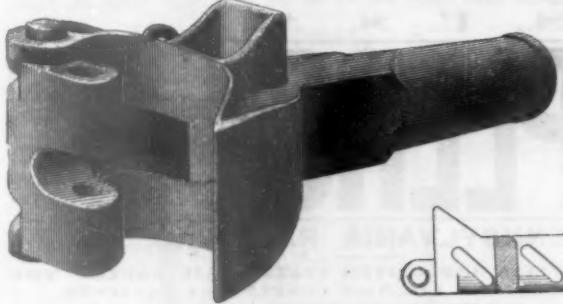


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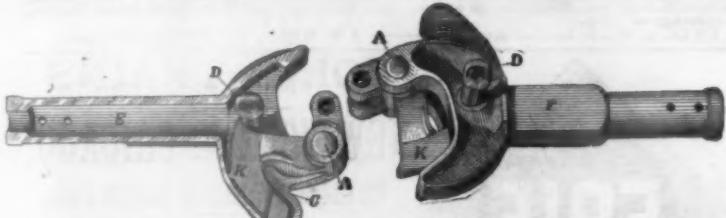
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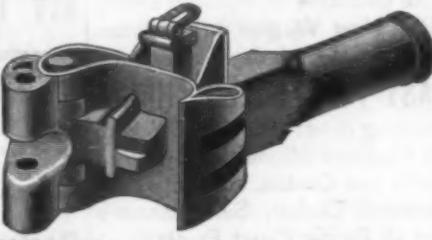
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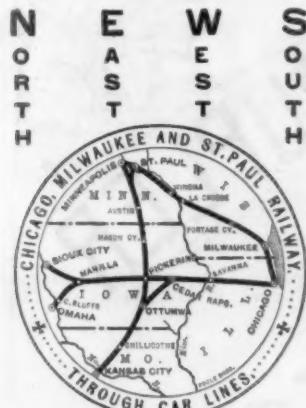
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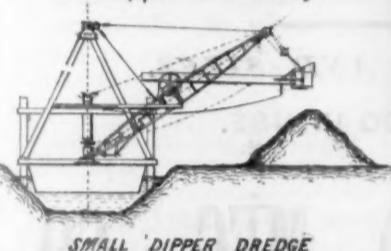
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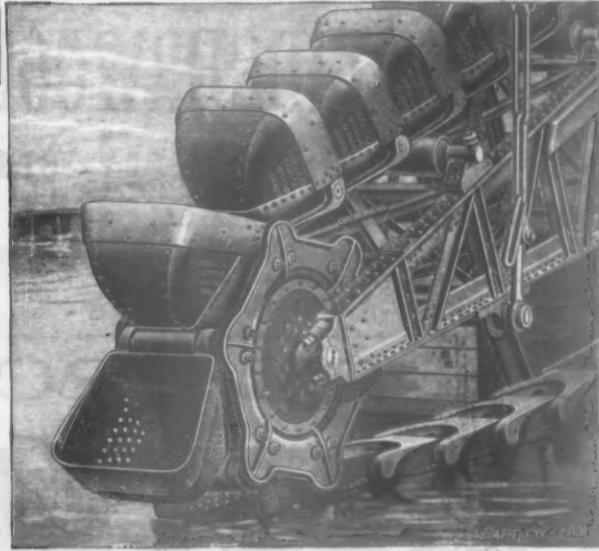


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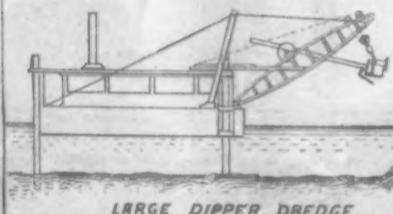
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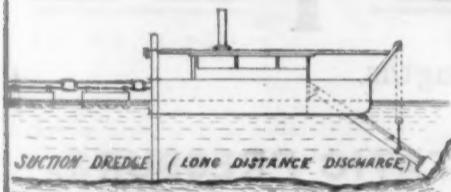
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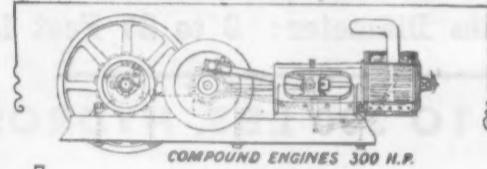


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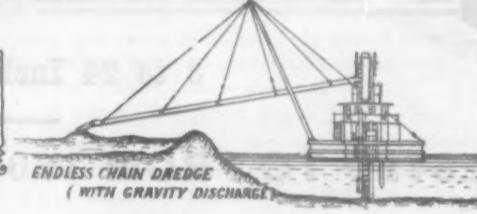
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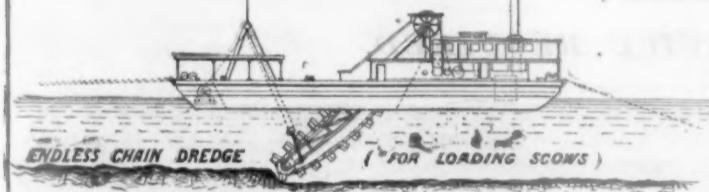
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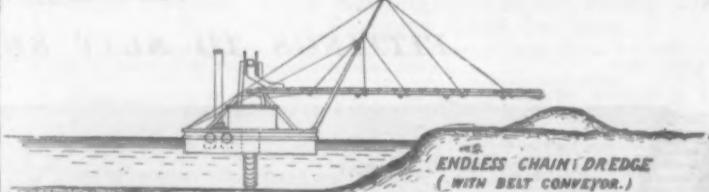
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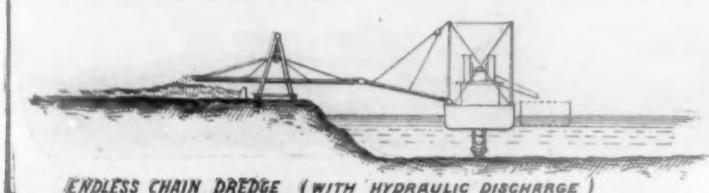
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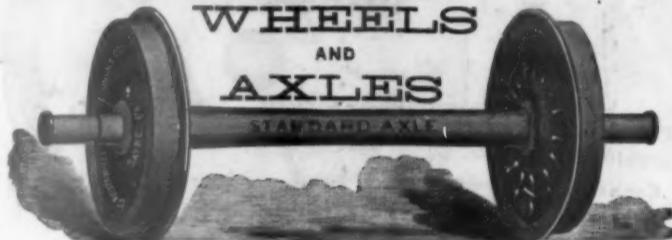
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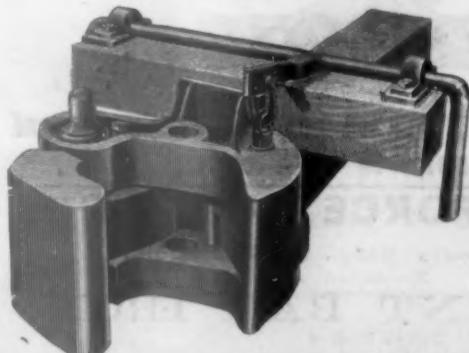
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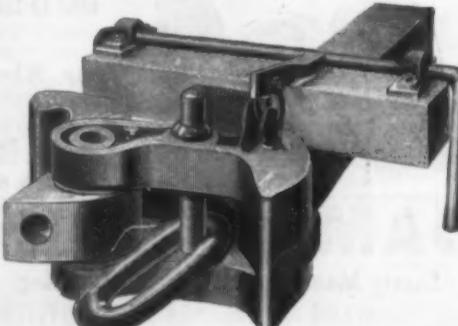
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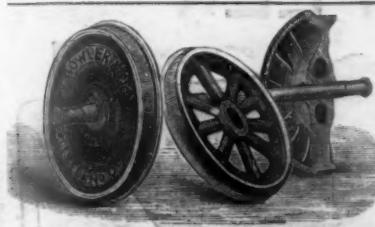
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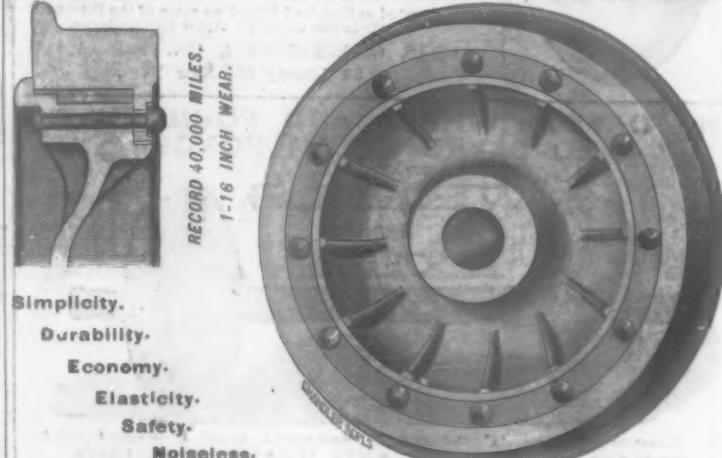
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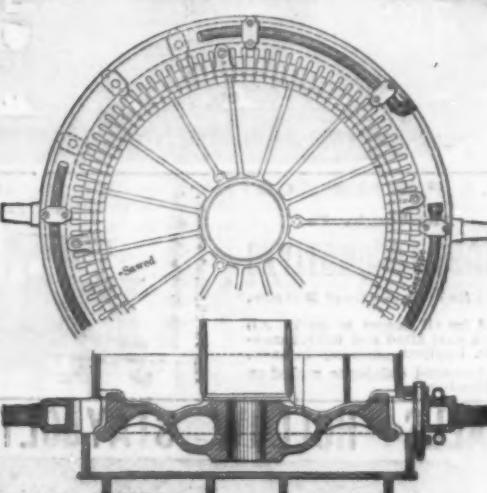
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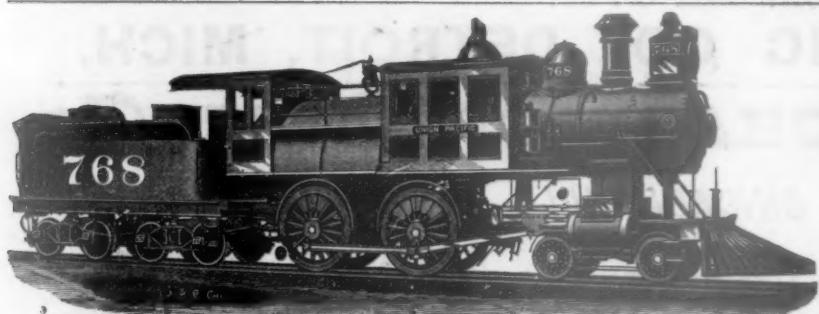
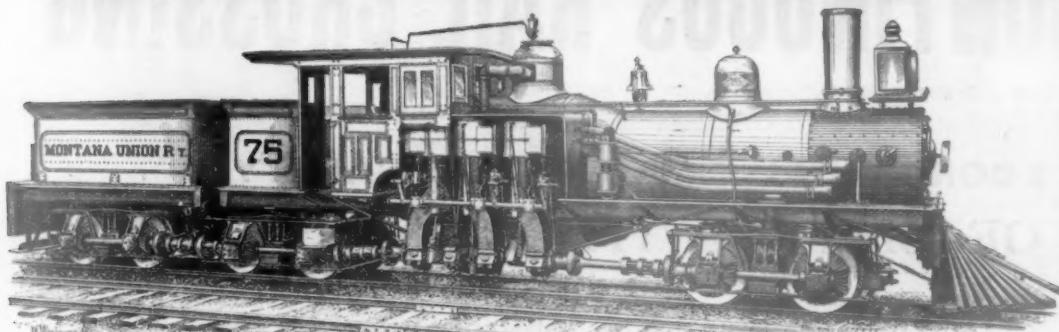
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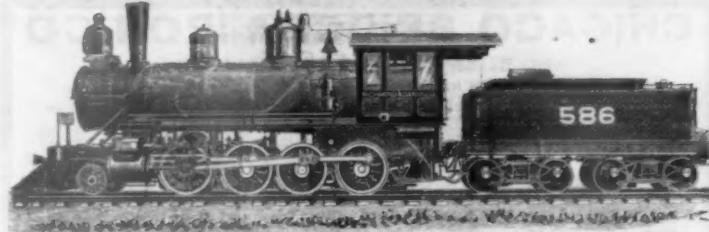
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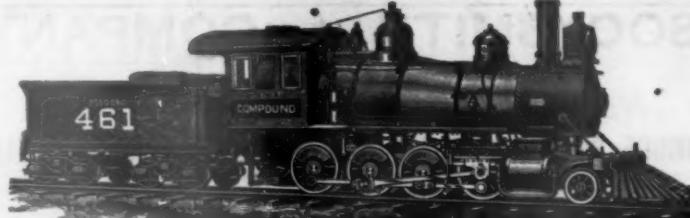
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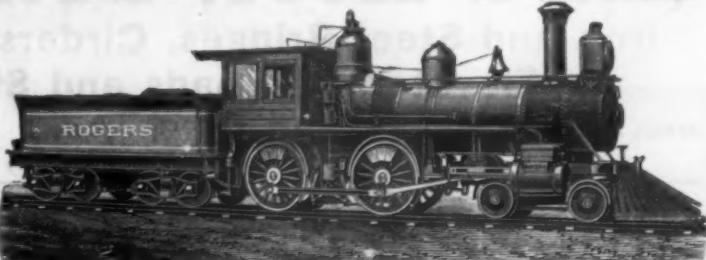
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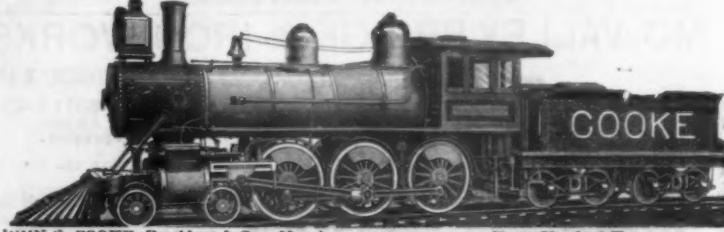
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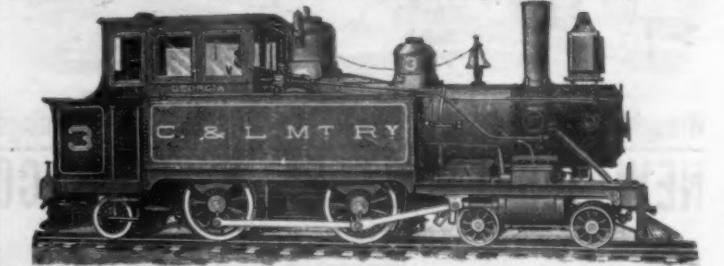
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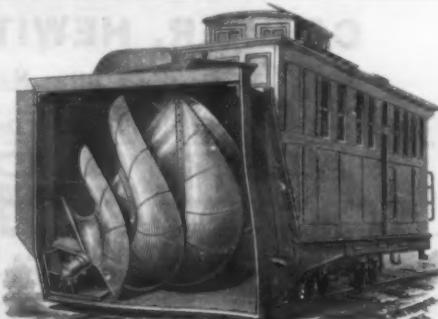
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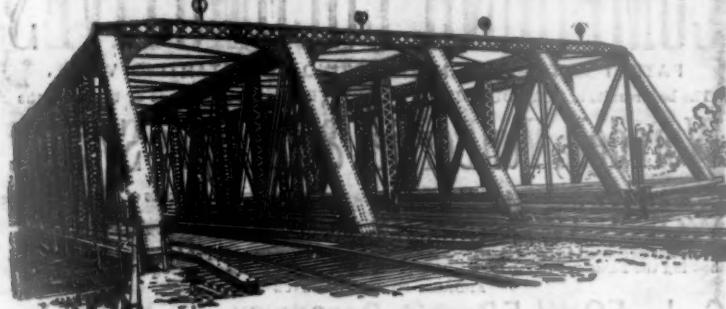
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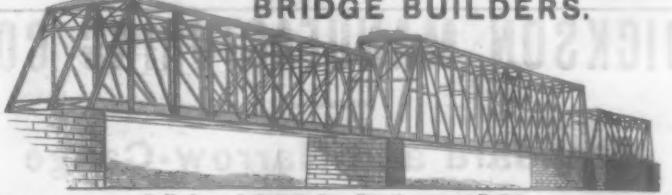
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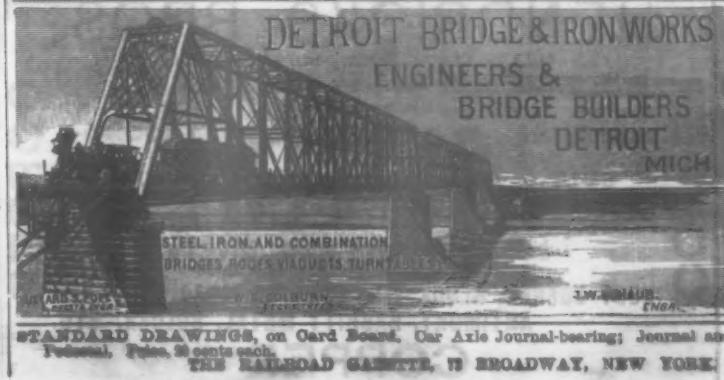
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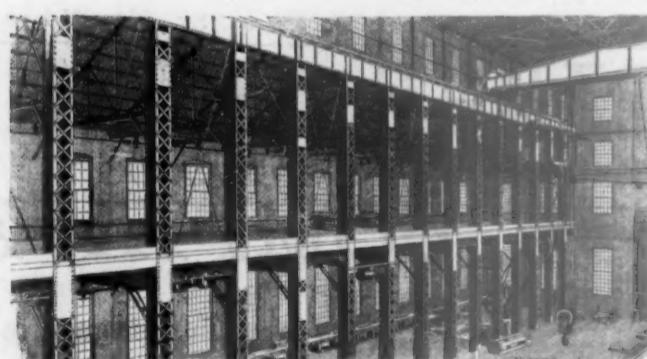
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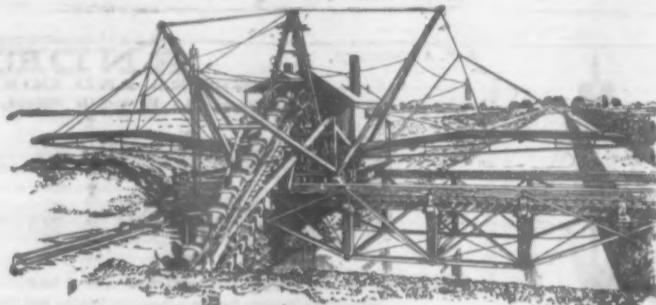
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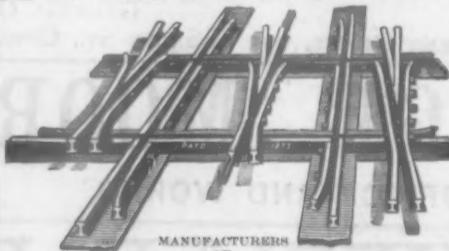
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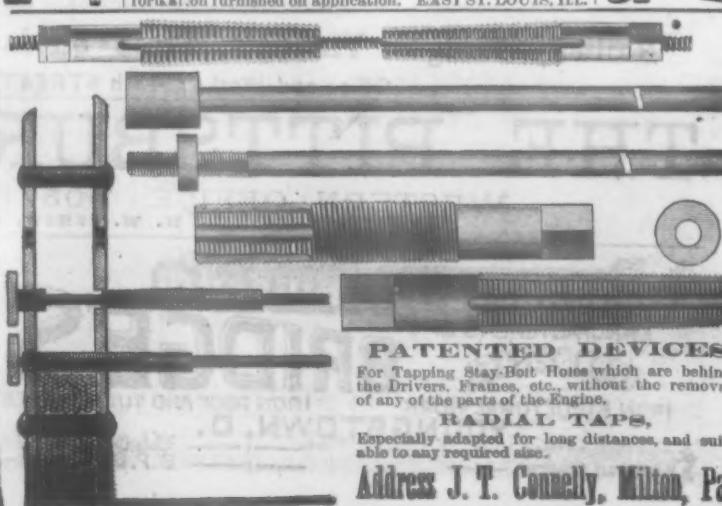
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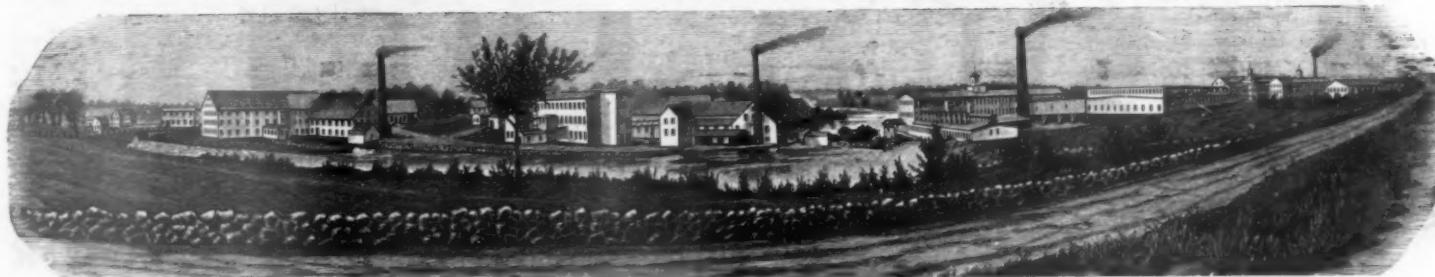
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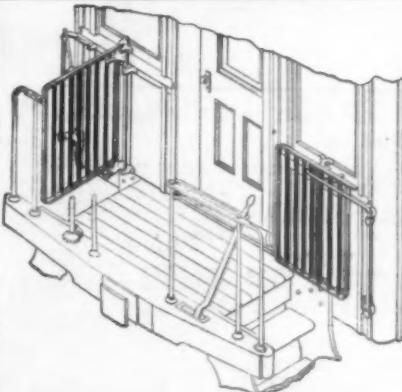
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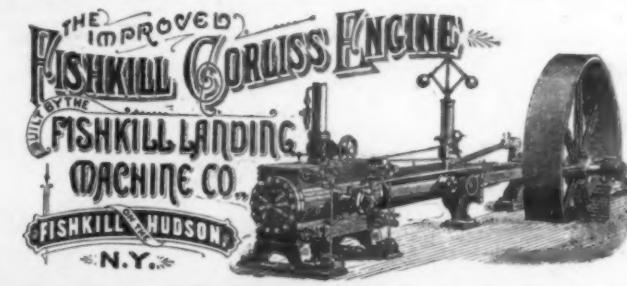
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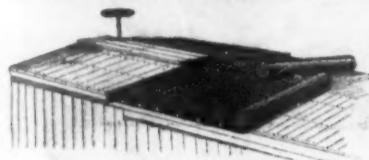
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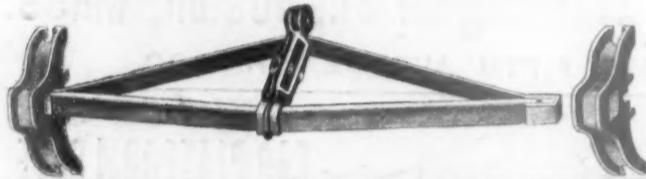
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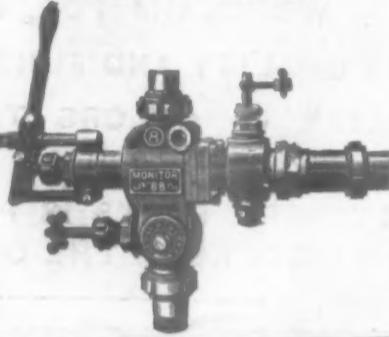


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